Collaborative Knowledge Building: A Case Study

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What learning conditions are necessary to effectively support the knowledge-building enterprise in a learning community? To answer this question, the case-study method was employed to investigate collaborative knowledge building in a graduate level course designed to incorporate specific constructivist learning principles. These principles included (a) having a collective and authentic community goal to facilitate collaboration and engagement in the community, (b) using cooperative groups to provide for social negotiation and to promote multiple perspectives, (c) personally selecting of course readings and group decision-making to encourage ownership in learning, and (d) employing an integrated set of technology tools to archive the work of the community and facilitate communication. Results indicated that the instructional strategies designed into the course promoted collaborative knowledge building and the acquisition of key concepts through self-directed learning strategies. Results also pointed out the types of technological support required to implement an effective community of learners. A proposed set of guidelines is discussed to assist instructional designers in the design and development of collaborative, knowledge-building environments.

In an information society, knowledge moves into the forefront and becomes an object with which people work (Bowen, Bereiter, & Scardamalia, 1992). This suggests that students must become knowledge workers to function effectively in today’s digital age. A constructivist philosophy of education may offer a means of teaching students to become knowledge workers, because constructivist practices are concerned with a learner’s ability to use and manipulate information in authentic situations that have high relevance for the student (Lebow & Wager, 1994). Constructivist learning environments can provide opportunities for students to access, use, manipulate, and evaluate information using authentic problem-solving activities and strategies that focus on generative teaching and learning.

Making a shift toward a constructivist educational philosophy requires a change in focus from individual knowledge constructed singly to public knowledge jointly constructed by students (Brown, 1994; Brown & Campione, 1990; Scardamalia & Bereiter, 1992; Wenger, 1998). A constructivist orientation represents a fundamental change in education where the goal is to modify closed classrooms into knowledge-building communities that enable students to contribute to each others’ learning through social construction of communal knowledge (Lebow, 1995).

Collaborative Knowledge-Building Communities

Knowledge-building communities arose from the idea that schools should be restructured as communities in which knowledge is constructed...
as a collective goal (Scardamalia & Bereiter, 1994). The main focus of activities within these environments is on developing the collective knowledge base of the community and improving the problem-solving expertise of the learners. According to Lebow, Wager, Marks, and Gilbert (1996), a key principle guiding the design of knowledge-building communities is that the artifacts or objects produced by the learners are not simply passed in for a grade, but become public materials that support the goals of the community and its individual members. The resulting database of information archives the materials produced by the learners and is evidence of the community’s advancing knowledge and expertise (Lebow et al., 1996).

This shift to a communal approach to learning changes the focus of the teaching and learning process. Bowen et al., (1992) characterized knowledge-building communities with four primary traits:

1. A focus on knowledge and the advancement of knowledge rather than tasks and projects.
3. Dynamic adaptation in which advances made by members of the learning community change the knowledge conditions requiring other members to readapt, resulting in continual progress.
4. Intellectual collaboration as members pool intellectual resources, making it possible for communities to solve larger problems than can individuals or small groups.

In the last decade, increasing attention has been paid to how computers can be used to support and facilitate learners as they interact and solve problems (Pea, 1994). This emerging interest is concerned with the design of tools that contribute to collective activity, and is characterized by authentic, collaborative work facilitated through the use of networked computers. The use of networked computers provides alternatives to traditional teaching and learning as we move from a single-classroom concept to the concept of a knowledge-building community of learners.

The computer supported intentional learning environment (CSILE), developed by Scardamalia and Bereiter (1992), is an example of a learning environment that incorporates the primary traits of knowledge-building communities and computers as tools. CSILE attempts to reform student achievement through a variety of methods, including collaborative learning, and a focus on group projects rather than lectures. The groups are given the tools to research a particular topic, solve problems associated with that topic, and present the information to their peers for review. Networked computers are used as the primary vehicle to promote collaborative knowledge building because they facilitate easy input and retrieval of information as well as providing a variety of communication features. Collaborative knowledge building engages students with the topic instead of leaving them on the outside as passive observers. Learners do not rely on simple memorization skills but must engage in higher-order thinking and inquiry as they arrive at a variety of solutions to a particular problem (Scardamalia & Bereiter, 1994).

In CSILE, knowledge building, rather than knowledge replication or retrieval, is the focus of student activity (Scardamalia & Bereiter, 1994). Knowledge in this environment is dynamic, and is changed and reconstructed over time. That is, students jointly build a body of knowledge represented by the community database that is an aggregate of the community rather than the individual.

More than 10 years of research on CSILE show that this approach can have a powerful impact on learning (Bereiter & Scardamalia, 1996; Scardamalia & Bereiter, 1996). Results of students in grades 5–6 using CSILE in all content areas suggested that students demonstrate a high level of knowledge building compared to non-CSILE students. Knowledge building in this context is the construction of new information stored in the communal database associated with the formulation of questions to help students notice what information to add to the database. Results also showed that a large proportion of the questions generated by CSILE students are rated as “challenging and considered worthy of research” by teachers and other adults (Bowen et al., 1992, p. 92).

Additional research with CSILE demon-