

# Chapter 32

## Building Knowledge through the Cyber Space

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### ABSTRACT

*Knowledge building refers to social and collaborative processes to advance knowledge and ideas of value to a community, with individual learning and growth of members as an important by-product. Cyber environments to support knowledge building (e.g. Knowledge Forum) provide networked knowledge spaces where members contribute ideas and continually improve the ideas through collaborative discourse and other inquiry activities. Research on knowledge building using cyber environments sheds light on socio-cognitive and cultural dynamics underpinning knowledge building and technology-based designs to support such dynamics. In the context of education, research results demonstrate the possibility and benefits of engaging students in knowledge building early on to develop deep understanding in core subject areas and high-order competencies that are essential to 21<sup>st</sup> century careers.*

### INTRODUCTION

People in knowledge-based societies increasingly rely on cyber spaces to collaboratively build knowledge in support of innovative and productive work in their professional areas. An interdisciplinary research area has thus developed focusing social, cognitive, and technological dynamics for building knowledge through the cyber space, with implications to learning and knowledge work in

schools and other institutions. Knowledge building is synonymous to “knowledge creation” and refers to “the production and continual improvement of ideas of value to a community, through means that increase the likelihood that what the community accomplishes will be greater than the sum of individual contributions and part of broader cultural efforts.” (Scardamalia & Bereiter, 2003, p. 1371). Examples include global high-tech firms and networks that use distributed cyber

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environments to co-develop new generations of technology designs overcoming the limitations of the old; scientific communities that share new discoveries using online databases and continually produce new and better theories to explain new facts discovered; and students working similarly as knowledge building communities to identify and solve progressively deeper problems in core domain areas, using authentic knowledge processes and technologies to advance their shared knowledge. A wide range of cyber environments has been developed to support such collaborative and sustained endeavors of knowledge building in various contexts. In the context of education, knowledge building environments provide realistic means for learners to connect with civilization-wide knowledge creation instead of merely a desktop library and rapid mail-delivery system (Scardamalia & Bereiter, 2006).

## OVERVIEW

Research on knowledge building stemmed from an early focus on supporting intentional learning and expertise of individuals and has evolved to an emphasis on social production and advancement of collective knowledge. This change in focus has important implications to the design and use of computer-based environments to support collaborative learning and knowledge work.

In 1980's, Bereiter and Scardamalia proposed "intentional learning" as an intermediate concept in an attempt to loosen "knowledge building" from "learning." Intentional learning is defined as cognitive processes that have learning as a goal instead of an incidental outcome, and a matter of having life goals that include a personal agenda of learning, more than "active" or "self-regulated" learning (Bereiter & Scardamalia, 1989). To promote intentional learning, a computer software tool named "Computer Supported Intentional Learning Environment" (CSILE) was designed and implemented in education (Scardamalia et

al., 1989). CSILE was first prototyped in 1983 and initially used in university and graduate classrooms. Given its positive results in encouraging students to think more about their learning process, a networked version was then developed and used in an elementary school in 1986. At that time, CSILE was designed to support intentional learning by providing a means for students to build a collective database of their thoughts in the form of pictures and written notes. Supporting tools allow students to edit, label, and organize their notes. Epistemological markers, such as "My theory," "I need to understand," "New information," and so forth are integrated into the text of notes to encourage intentional discourse contributions focused on substantive issues under investigation. The shared space provided by CSILE serves to change teacher-centered communication flow in classrooms so that all information and resources (e.g., questions, ideas, criticisms, and suggestions) are contributed to a public space equally accessible to all. This perspective on collaborative, high-order knowledge processes constitutes a conceptual pillar of computer-supported collaborative learning (CSCL), a fast developing research field, and is further advanced through knowledge building theory and new generation technologies.

By the 1990's the concept of knowledge building as collaborative creation of public, collective knowledge had assumed ascendancy, with individual learning as an important and demonstrable by-product (Scardamalia, Bereiter, & Lamon, 1994). CSILE was redesigned and re-engineered as Knowledge Forum (Scardamalia, 2004), which has an explicit focus on advancing collective knowledge through collaborative, knowledge building discourse in line with authentic knowledge creation practices in knowledge organizations. The heart of Knowledge Forum is a multimedia community knowledge space. In the form of notes, participants contribute theories, models, work plans, evidence, reference materials, and so forth to this shared space. The software provides supports in the ways notes are created,

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