Designing a Collaborative Learning Environment for Knowledge Integration

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***Abstract*—A collaborative learning environment has been created and tested to encourage college students integrate knowledge by mutually reflecting on their externalized ideas. We will report a two-year undergraduate cognitive science curricular with technological scaffolds for collaborative reflection and knowledge integration, with some evaluation.**

***Index Terms*—Collaborative learning, Knowledge integration**

I. COLLABORATIVE KNOWLEDGE INTEGRATION

We have been developing and testing a collaborative undergraduate curriculum to teach cognitive science [1][2][3], based on existing cognitive scientific research. In our curricular students are assumed to take responsibility of understanding an assigned, or self-selected research piece well enough to be able to explain it to others, so that they could exchange their learning with each other. This collaborative learning process assumes (1) generation and externalization of new understanding, (2) collaborative reflection on such externalization, and (3) knowledge integration, which in turn feeds into next level comprehension. Students are expected to engage in this cyclical process for their own knowledge integration.

II. SCAFFOLDS FOR KNOWLEDGE INTEGRATION

Students keep electric records for collaborative reflection, which, over the course of years, accumulate into a shareable knowledge base. In order to support this collective knowledge integration, we have developed and tested the following three tools.

MMD: Multimedia Document system (Fig.1) is a three-dimensional note sharing space for multimedia elements, each of which can be annotated and linked to other elements.

Fig. 1.: Multimedia Document System

Students are encouraged to integrate various learning materials on MMD throughout the courses.

CMS: Commentable Movie Sheet (Fig. 2) lets the students clip video materials and attach comments, which published onto the the web for commenting, for collective reflection.

Fig. 2.: Commnetable Movie Sheet

ReCoNote: Reflective Collaboration Note (Fig. 3) is a two dimensional, text-base note sharing system for easy idea externalization, whose notes are also mutually linkable. ReCoNote is mainly used during the class, as scaffolds for group discussion.

Fig. 3: Reflective Collaboration Note

We are currently examining various forms of collaborative learning with these tools in real classrooms. ReCoNote has been found to be highly effective in promoting extended group discussion, particularly in the second year, when the students are more skillful in conducting collaboration for learning. CMS has been successfully used to help students learn from lectures by decompose the videos and focusing on and linking together important clips. We are also developing new evaluation methods to design more effective learning environments.

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