Intentional Integration Supported by Collaborative Reflection

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ABSTRACT

The skills for thematic, or intentional, integration of independent pieces of research, a highly difficult but important task in academic training, is analyzed (Study 1) and supported by collaborative reflection (Studies 2 and 3). The results indicate that simple scaffolds combined and embedded in a collaboratively reflective curriculum can support this highly complex task.

KEYWORDS: Intentional integration, thematic integration, collaborative reflection

INTRODUCTION

In advanced collaborative classrooms, learners must not only study selected topics in groups but must also integrate such contributed pieces of work to understand the overall theme. In study 1, we found advanced students actively decompose each work into structural pieces and recompose them to form an entirely new structure. Study 2 tries to support such steps with simple scaffolds like card arrangement, embedded in thematically well-formed classroom activities. In Study 3, repetitive collaborative reflection was enforced on summary presentations of several independent research pieces, which resulted in the juniors understanding the topic better. The overall results indicate that simple scaffolds combined and embedded in a collaboratively reflective curriculum can support the highly complex task of intentional integration.

STUDY 1

PROCEDURE

Groups of cognitive science major students, ranging from sophomores and graduate students to a professional researcher, were asked to integrate five independent introductory articles on human intelligence ("Exploring intelligence," Scientific American Present 1998, Japanese edition). Fifteen cards were prepared to represent three structural elements of a research paper, "research background," "main findings," and "implications." The 15 cards were used for integration in this study. The sophomores read the articles in a jigsaw-puzzle fashion. The cards were expected to serve as scaffolds. Sophomore groups and five other mixed groups of juniors, seniors, graduate students and a professional researcher arranged these cards onto an A3-size sheet of paper, to support writing the summary by collaboratively reflecting upon them.

RESULTS

The task took 30 to 60 minutes depending on the experience of the subjects. Three typical layouts from the three group categories are shown in Fig. 1. Card number 1 means that the card is taken from article No. 1 and so on. Figure 1 a) was prepared by sophomores, who mostly preserve the independence of each article. Figure 1. b) was prepared by juniors to seniors lead by an advanced doctoral student, with a chunk consisting of three "research background" cards from three different articles. Figure 1 c) is a product of a professional researcher, which shows a complete reconstruction of the structural elements of the original articles, in clear contrast to a) and b). The professional researcher actively decomposed the pieces so that she could entirely reconstruct a new integrated view of them.

a)   b)   c)
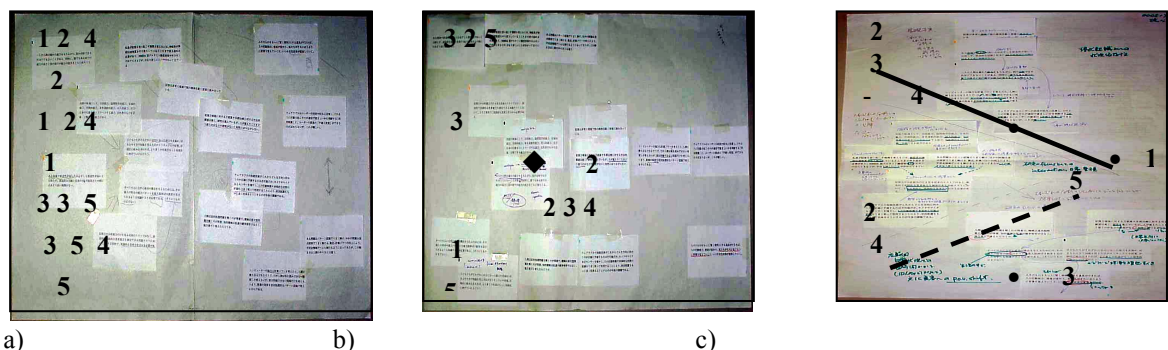
Figure 1: Card arrangements of integrating independent articles.

This card arrangement environment is now computer implemented and usable for further explorations.

STUDY 2: PROCEDURAL SUPPORT FOR INTENTIONAL INTEGRATION

PROCEDURES

In order to see whether specific scaffolds are possible for professional-like integration, sophomores in cognitive science classes were asked to extract important pieces from original articles and record them onto small cards, and then to thematically integrate them by arranging the cards two-dimensionally. The visibility and the tangibility of the cards and their arrangement are expected to raise the chances of collaborative reflection, which then would raise the quality of the summaries. The task was to integrate three independent pieces of work, "sensory deprivation," "intrinsic motivation and spontaneous learning," and "the negative effect of rewards on intrinsically motivated behavior." The extraction of the cards was further guided by the same set of questions focused on structural elements used for all the articles. For the experimental group, the cards were colored differently according to the questions, so that the same color would guide the gathering and comparison of the answers to the same questions to facilitate the reconstruction. Seventy-six sophomores participated in this study. Forty formed 12 groups, to whom colored cards were given. The other 36 students were divided into 12 groups to whom only white cards were given. At the end of the task, they summarized their integrations individually. The entire process was technologically supported with note-sharing and presentation systems.

RESULTS AND IMPLICATIONS

More than half the subjects who used the colored cards could give detailed summaries, while less than 10% in the control group (white cards) did the same. At the end of the individual reading session, the ratio of the sophomores who extracted the main points with sufficient detail was found to be 54% in the experimental group compared to 21% in the control group. This conspicuous difference between the conditions suggests that the color-coded cards helped the experimental group students to yield richer resources for later collaborative reflection.

STUDY 3: REPETITIVE COLLABORATIVE REFLECTION FOR THEMATIC INTEGRATION

Study 1 clearly showed that intentional integration skill was acquired through long-term experience, for which classrooms rarely provide enough chances. Study 3 investigated the effects of repetitive exposure of integration in collaborative reflection in an attempt to supplement such professional experience. Twenty-eight junior students in our cognitive science course were required to create repetitive presentations to the class on seven studies of Wason's selection task: the original Wason experiment, the thematic bias studies, the pragmatic reasoning schema studies of Cheng and Holyoak, and Cosmides' social contract theory. They worked in seven groups.

A typical thematic integration would include explanations of the classic, laboratory-based human reasoning skills research, and more situated, or everyday cognition studies. It would also include how Cheng and Holyoak reconsolidated them from a cognitive psychological stand point with their new construct of "pragmatic schemas." A typical "lecture" on this topic would run in this fashion but is not easily absorbed by the students. In one of the first author's surveys, at the end of the semester course, only two out of 86 students could explain how the pragmatic scheme worked, the core construct of the Cheng and Holyoak paper.

PROCEDURE

The task given to these 28 students in this class was to construct a 15-minute talk to sophomores on this topic. During the six-week course with two 90-minute classes per week, the students were asked to give three short, preparatory talks and one final, full-scale talk to the class, with ample time for class discussion as a chance for collaborative reflection.

RESULTS AND IMPLICATIONS

At Week 4, only one out of seven groups could start structural integration of the pieces. At the time of their presentation in the fifth week, five groups gave highly structured presentations, integrated in the sense that they decomposed parts of each research to restructure the entire set of seven studies. Their presentations were marked with descriptions like dichotomizing experimental approaches of logical reasoning studies against more situated views. This indicates that the students in their junior years have the basic capability to integrate research pieces by decomposing, identifying and restructuring the constructs of the research. However, careful analyses of the content reveal that the presentation quality is distinctively different from that which a normal professional researcher would produce (in particular, they tended to lack precise descriptions of pragmatic schemas, how it works and/or its development), showing that they can make use of better supports, if available.

GENERAL DISCUSSION: TOWARD THE INTEGRATED SUPPORT ENVIRONMENT

The acquisition of appropriate skills for proper intentional integration requires more than a single technological support in one course College courses, particularly the ones in an interdisciplinary field like cognitive science, should be more integrated with each other, and should be conducted in a technologically rich environment. In such a learning environment, students from their first year to graduation can gradually participate in and take advantage of the collaborative reflection so that they can incorporate it into their meta-cognitive repertoire.