

How to scaffold learning from lectures?

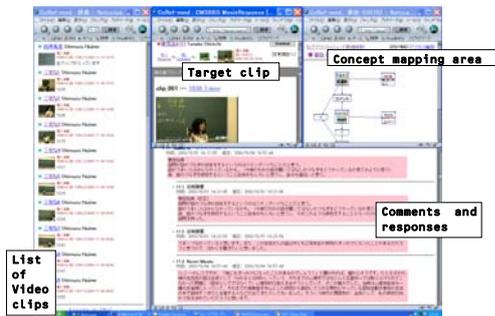
Lecture

- + can be an effective way to deliver rich information
- linear inputs, impossible to review without records
- not students but lecturer integrates knowledge

Retrospective interview 5 to 12 months after shows

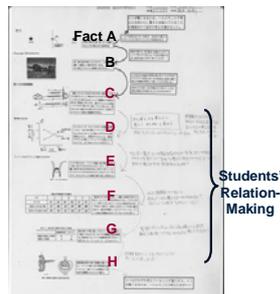
- 45% of students reported nothing, 21% did only *theme* or *setting* (exp. materials or procedures), but
- + 16% reported *results*, and 19% did *implications*.
- ↓ At their end-of-lecture notes ↓
- + 68% summarized *results*, and 71% did *implications*.
- ⇒ Positive effect of verbalization on retention

Scaffold 1: Commentable Movie Sheet on BBS



Scaffold 2: Guided reviewing in the class

- 1) Teachers clipped a lecture and selected the clips that include *results*.
- 2) Students were asked how they had been *related* in the lecture.
- 3) They were then asked what *implications* these *results* could have and to write them on CMSonBBS.



Research context and assessment

Cognitive science major sophomores; two semesters

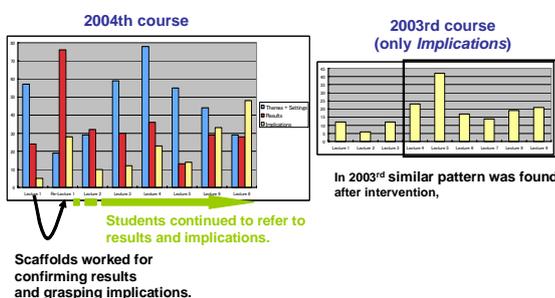
2004th course	
The Scope of Cognitive Science	
1	Lecture by faculty member 1
2	Reflection on Lecture 1
3	Lecture by faculty member 2
4	Lecture by faculty member 3
5	Reflection on Lecture 1, 2, 3
6	Reflection on Lecture 1, 2, 3
7	Reflection on Lecture 1, 2, 3
8	Learning how to learn from lecture: Using lecture delivered last year by faculty member 5
9	Lecture by faculty member 4
10	Lecture by faculty member 5
11	Lecture by faculty member 6
12	Lecture by faculty member 7
13	Lecture by faculty member 8
14	Lecture by faculty member 9
15	Lecture by faculty member 10
16	Reflection on all lectures

Does scaffolds work?

Does the skill transferred to other lectures?

Coding definition of end-of-lecture notes	
Themes & Settings	Only themes of the findings or settings without results
Results	Results of experiments, observations, system implementations...
Implications	Author's interpretations and implications

End-of-lecture notes



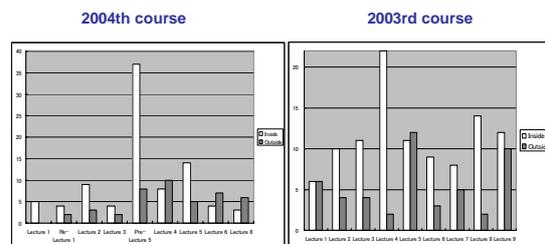
From comprehension to question asking

Implications are some abstraction of lecture contents, which enable students to locate each lecture in broader scope, for example, connecting it to other lectures or classes, or to own experience or knowledge.

How can it be possible, and how CMSonBBS supports this process?

	Definition	Example
depth	Level 1 Clarification of meanings of technical words or ordinary words used in technical ways	"What is the definition of consciousness?" "To what meaning did you use the word 'mind'?"
	Level 2 Clarification of the study -Why: Mechanisms behind the phenomena -How: Detailed description of the phenomena -When: Future directions or present states.	"Why we could not notice the difference between two pictures in your demonstration, 'Changed Blindness'?" "How did subjects change their strategies in the latter half?" "When will your proposal be realized in computer program?"
	Level 3 Criticism of the study -Generalizability: Subjects, tasks, experimental procedure... -Validity: Measures, interpretations of the results, or implications for everyday world	"Can you generalize your finding to other tasks or kinds of people?" "What kinds of cognitive processes did your measure capture?" "Can you actually say that we are in non-understanding states when our points-of-view are not stable?"
breadth	Level 1 Irrelevant or mere association	"Will computer understand music someday?"
	Level 2 Clarification or criticism of the study or relations between the studies based on one's own understanding or knowledge -Clarification of the word contrasting with its use in everyday contexts or other literature -Clarification of phenomena or constructs closely related to the study -Criticism of explanations of the mechanism by proposing alternatives -Criticism of the study about its feasibility	"What is the difference between your use of the consciousness and that of mass media like 'Inconspicuous by accident'?" "Is your demonstration related to the construct, 'Affordance'?" "Can we interpret your results by demand characteristics of the task?" "How does the study of the learning processes of computer programming relate to that of human consciousness?" "Even if you succeed in computer programming, how you measure the degree of consciousness' existing in computer?"
	Level 3 Expansion of the study into everyday contexts or alternative researches by proposing concrete ideas	"In your study, the subjects folded origami only into bird-form again and again, but if they are asked to fold the different form, can they fold it sooner than novices because they have gained expertise in folding or just the same?"

Counting questions of levels 2 & 3 in both categories



The number of questions dealing with the lecture itself increased first, then that of questions dealing with the relation between the lecture and its outside elements went up.

High-quality Q&A exchanges between T and S or among Ss promoted class culture of question asking though CMSonBBS.

"On externalization" by MO 2003/11/26 17:39:56

Concerning to Lecture 8, I think that externalization of knowledge has been gained as our skills through many collaborative works in classes of CogSci. (Outside Level 2) In problem solving, externalization of solving processes are important for confirming intermediate results. (Significance)

"Sharing the processes" by HH 2003/11/29

I agree with you. Externalization of solving processes enables others to provide with new perspectives. (New Significance) It reminds me of Lutchins' water jar problem and nine-dot problem, where the sharability of processes is a key. (Outside Level 2) I wonder whether a single condition or a paired condition is better when they are asked to solve the Lutchins' problem without pencil, but I don't have an answer. (reach for Level 3)

"Lutchins without pencil?" by Teacher 2003/12/03 09:27:50

It's wonderful to ask such a concrete question. (Level 3-appropriation) I have my answer, but you can go on to ask as;

(Lutchins vs. Nine-dot) × (single vs. paired) × (with external records or not)

What do you think? (Level 3- RQ & Design)

"My postulate" by HH 2003/12/04

About nine-dot problem, the paired members can not solve it easily without pencil, because they cannot see each other's process. But about Lutchins' problem, where the paired members with pencil tend to try to complete own calculation processes and stuck in fixedness, without pencil there may happen an exchange between the members like one verbalizing the calculation and the other checking it with the figure, which might lead to better performance. (Level 3-Hypothesis)