Looking at Learning

NSF CCLI Meeting
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Looking at Learning
An Interactive Workshop

Goals:

1. describe what we want to know about our learners

2. describe your innovation with respect to the research findings from "How People Learn"

3. develop a list of research questions we would like the answers to about our learners

Workshop Process

Workshop process: Think/Pair/Share

Think – individually think about some topic

Pair – discussion with a colleague

  (someone not in your own discipline, preferably someone you do not know)

Share – group discussion

Thinking about learners

Think: create a list about what you would like to know about the learners in your classrooms (1 min)

Pair: discuss your list with a colleague (2 mins)
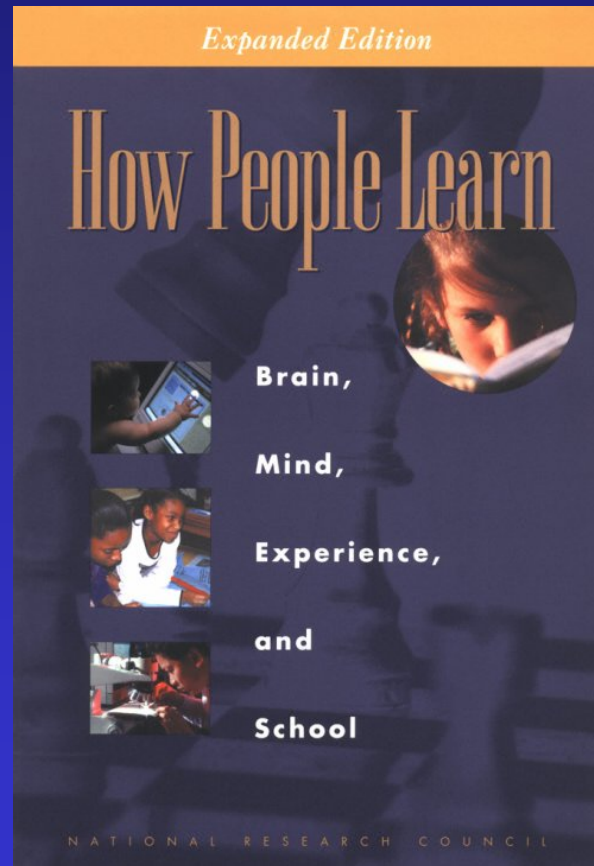
Share: generate group list (6 mins)

Thinking about your innovation

Think: create a list about what you know about the learners in **your CCLI innovation** (1 min)

Think: create a brief description about **your CCLI innovation** (1 min)

Pair: discuss your list with a colleague (4 mins)

Thinking about your innovation from the "*How People Learn*" Perspective

Describing our innovations in terms of Key Findings
"*How People Learn*"

Why?

    1 – Credibility

    2 – Flexibility

    3 - Adaptability

"*How People Learn*"

Three main findings:

- Students have preconceptions

- Knowledge organization matters

- Students benefit from a "metacognitive" approach to instruction

National Resource Council, How People Learn: Brain, Mind, Experience, and School. National Academy Press, April 1999.

Preconceptions

1. "Students come to the classroom with preconceptions about how the world works.

   If their initial understanding is not engaged, they may fail to grasp the new concepts and information that are taught, or they may learn them for purposes of a test, but revert to their preconceptions outside the classrooms."
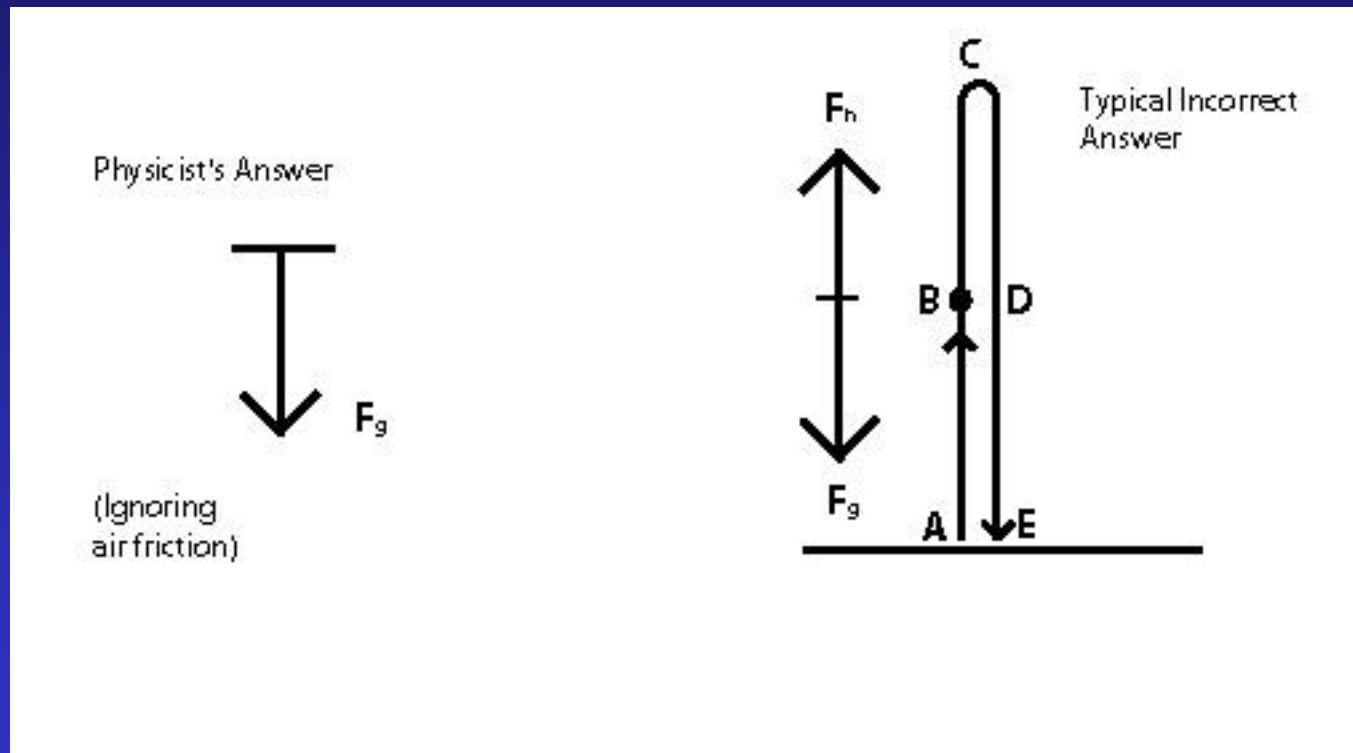
Student Preconceptions
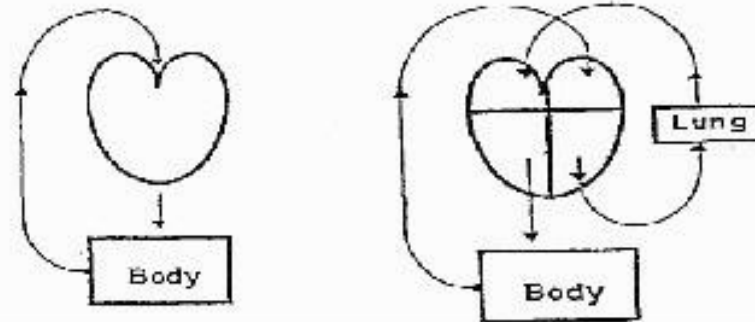
Assumptions	Single Loop	Double Loop
Source of oxygen	Heart	Lungs
Purpose of lungs	Destination of oxygen	Site of O_2- CO_2 exchange
Number of Lungs	One	Two

Figure 1. Differences in the assumptions between a flawed single loop mental model and the correct double loop model.

Student Preconceptions

Student preconceptions: Applying to your innovation

Think: in what ways does your innovation take into account student preconceptions? (2 min)

Pair: discuss with a colleague (4 mins)

Share: discuss as a group (6 mins)

Organization of Knowledge

2. "To develop competence in an area of inquiry, students must:

a) have a deep foundation of factual knowledge,

b) understand facts and ideas in the context of a conceptual framework, and

c) organize knowledge in ways that facilitate retrieval and application"

-> Draws on research on expert/novice differences

Expert/Novice differences in physics
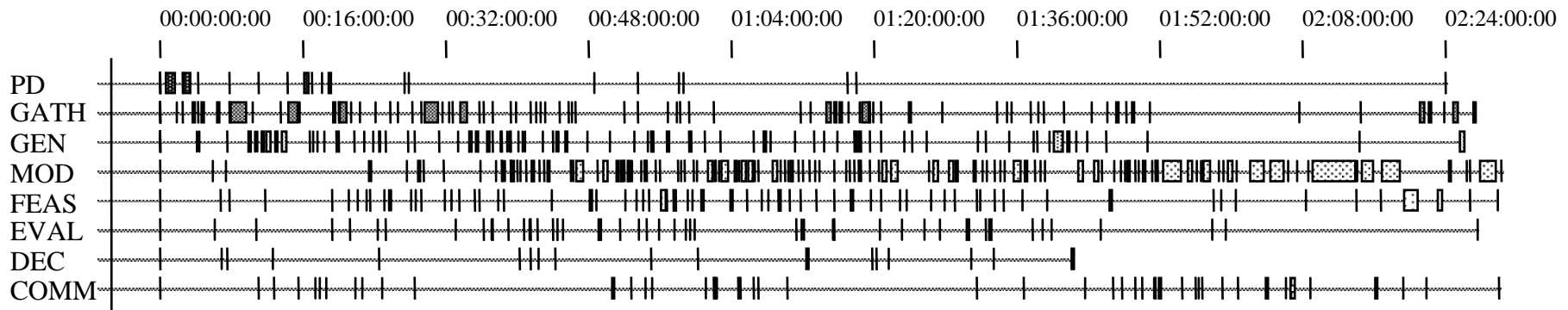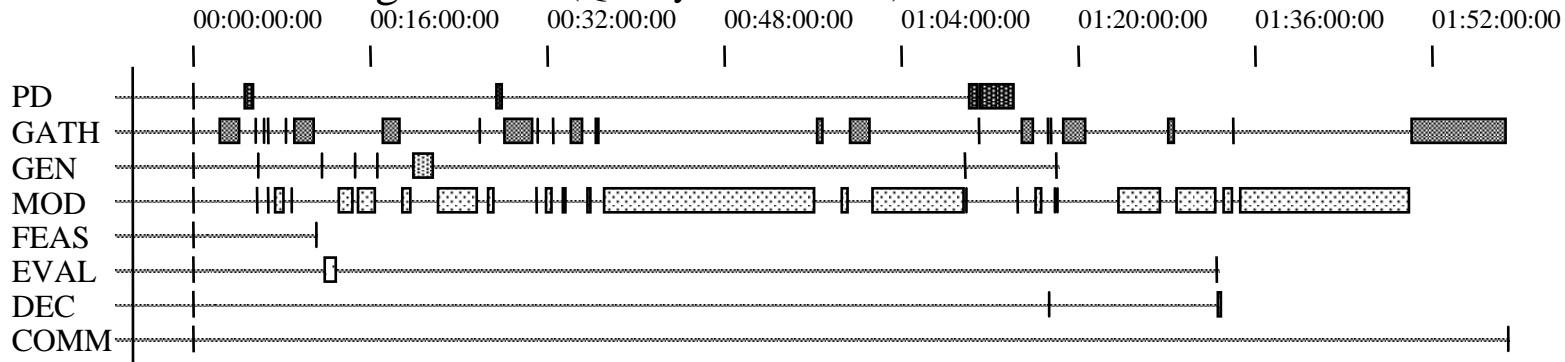
Senior/Freshmen differences in design processes

Successful Graduating Student (Quality Score = 0.63)

Canonical Entering Student (Quality Score = 0.37)

Atman, Cynthia J., Justin R. Chimka, Karen M. Bursic, and H. L. Nachtmann, "A Comparison of Freshman and Senior Engineering   Design Processes," Design Studies, vol. 20, no. 2, pp. 131-152, March 1999.

Engineering Student Knowledge Networks
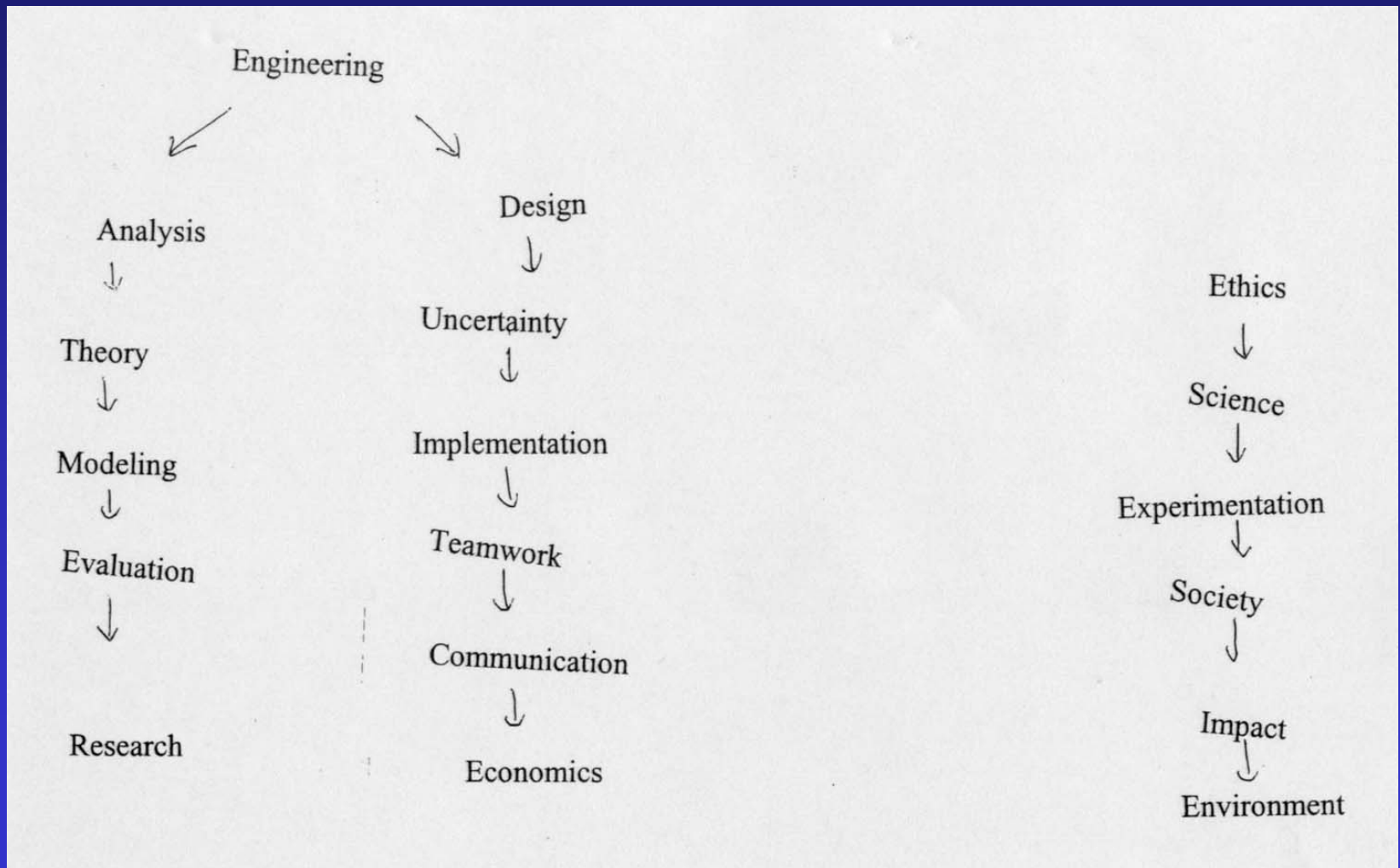
Engineering Student Knowledge Networks
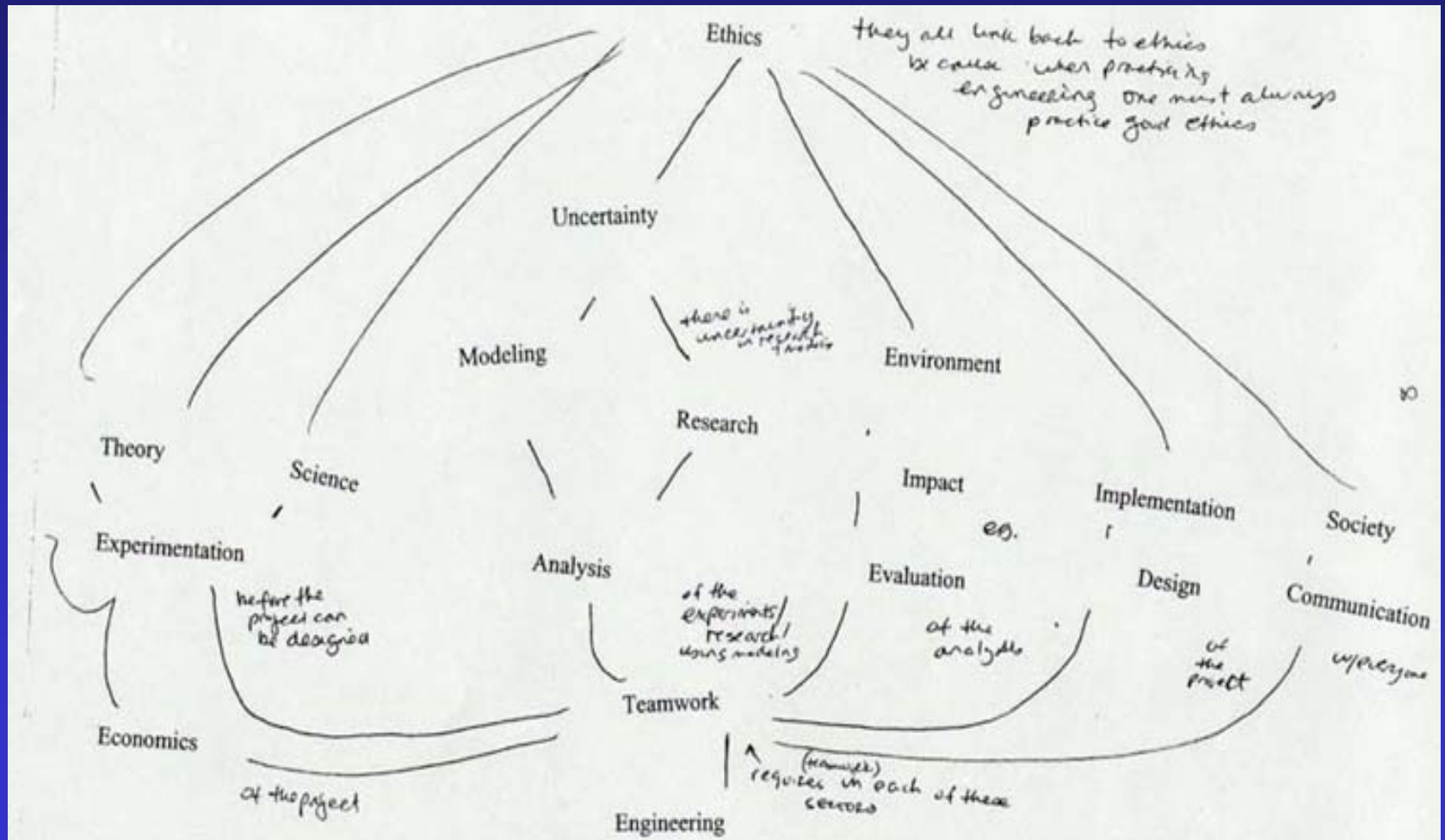
Engineering Student Knowledge Networks

Student One:

Student Two:

Turns, Jennifer, Cynthia J. Atman, and Robin Adams, "Concept Maps for Engineering Education: A Cognitively Motivated Tool Supporting Varied Assessment Functions," IEEE Transactions on Education Special Issue on Assessment, May 2000.
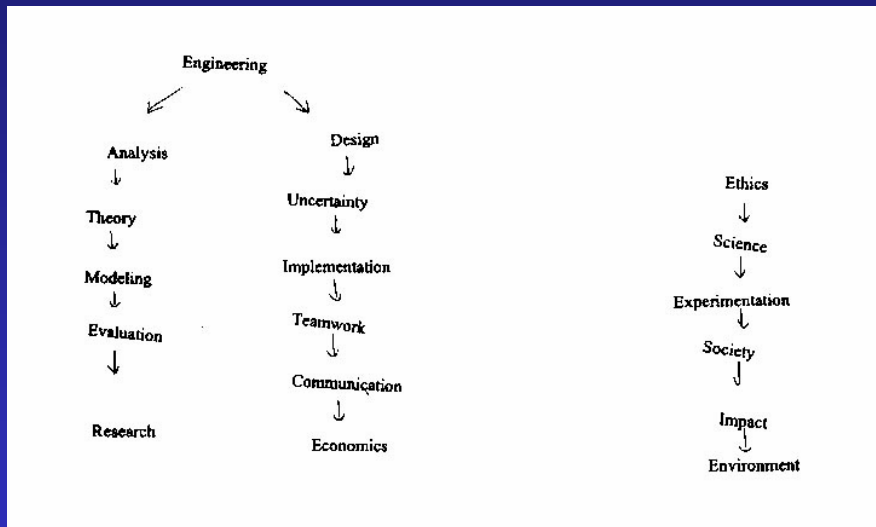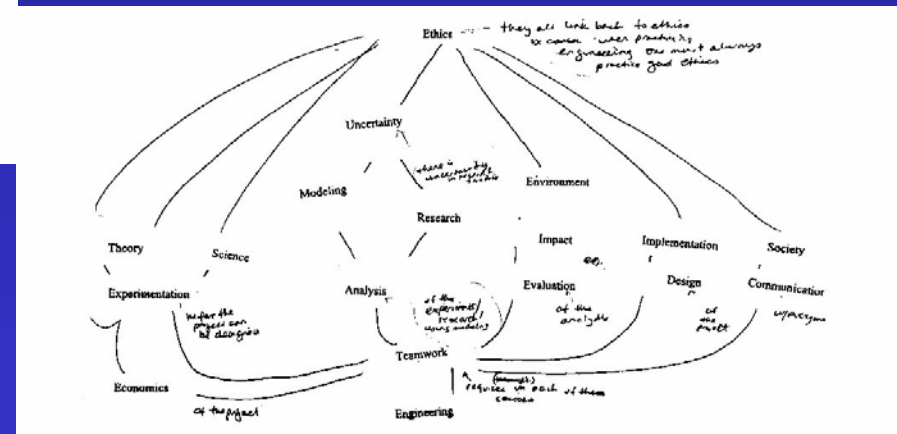
Knowledge organization:
Applied to your innovation

Think: in what ways does your innovation take into account knowledge organization? (2 min)

Pair: discuss with a colleague (4 mins)

Share: discuss as a group (6 mins)

Metacognition

3. "A 'metacognitive' approach to instruction can help students take control of their own learning by defining learning goals and monitoring their progress in achieving them"

National Resource Council, <u>Bridging Research and Practice</u>. National Academy Press, Chapter 2, p. 13. April 1999.
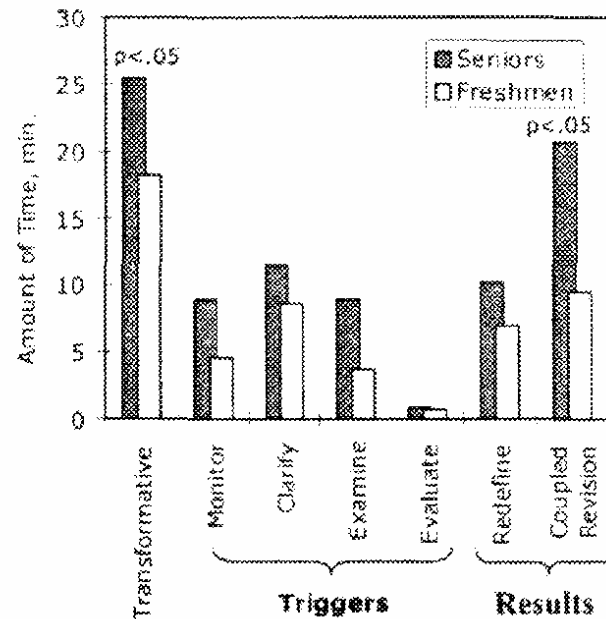
Metacognition

Figure 5. Differences in time spent in cognitive activities and processes in iterative activity for Freshmen and Seniors designing a playground

Metacognition

New Idea

An even better idea is …
An important point I haven't considered yet it …
A better arguement would be …

Improve

I'm not being very clear about what I just said so …
I could make my main point clearer …
A criticism I should deal with in my paper is …

Elaborate

An example of this …
This is true, but it's not sufficient so …
My own feelings about this are …

Goals

A goal I think I could write to …
My purpose …

Putting it Together

If I want to start off with my strongest idea I'll …
I can tie this together by …

Metacognition:
Applied to your innovation

Think: in what ways does your innovation take into account metacognition? (2 min)

Pair: discuss with a colleague (4 mins)

Share: discuss as a group (6 mins)

How is this useful?

Revisiting:

    1 – Credibility

    2 – Flexibility

    3 - Adaptability

Burning research questions?

Pair: develop two research questions about specific
things you would like to know about the learners
in your innovation (2 mins)

Share: discuss with group

Looking at Learning

Revisiting the workshop goals:

1. describe what we want to know about our learners

2. describe your innovation with respect to the research findings from "How People Learn"

3. develop a list of research questions we would like the answers to about our learners

Looking at Learning

Dedacated to Mom

My mom is helpfol she protecks us and macks shor evrything is all right if thers lova she cols the fire dapartment and she loves everyone aspeshaly her kids and husbind she helps everyone and shes a engineer

****

helpfol

by Tobyn Skye Meyer