We are the survivors of the journey into academe....
Decoding the Disciplines
By David Pace and Joan Middendorf
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The Case of the Troublesome Pit

Place take a few moments and read the short narrative that appears on the half-sheet.
The Case of the Troublesome Pit

Work in groups at your tables to answer the following questions about the case.

1. Given the test question, what seem to be the professor’s assumptions about what students should learn in this course?

2. What are the student’s assumptions about what she should learn in this course?
How do you think this student studied and prepared for this math test?
In your groups. Work for one minute to agree on the likely grade average of this student (overall, not just in this course).

Prepare to use the colored letter sheet to report your group’s final estimate, when you are asked to do so.

A
B
C
D
F
The Case of the Troublesome Pit

At your tables: As an instructor with some students like the one in the case, what could you do to change their thought processes and learning attitudes?
It’s easy to change what people know.

It’s much harder to change how people think.
And then there is the corollary...
It’s easy to **measure changes** in what people know.

It’s much harder to **measure changes** in how people **think**.
A tool for diagnosing and changing how students think:

**William Perry’s Scheme**
**of Ethical and Intellectual Development**

1. **Dualism**
2. **Multiplism**
3. **Relativism:**
4. **Commitment in Relativism**
Take a minute and write:

What 3 words first occur to you when you hear “Critical Thinking”?
Work as a group at your table

Merge your lists and then isolate (by consensus) the 3 most crucial and defining elements of critical thinking.

Prepare to share your distillation with the whole room.
Learning as information-reception

VS

Learning as developing skills and perspectives for independent problem-solving

(analyzing and using information)
“Critical Thinking is... self-directed, self-disciplined, self-monitored, and self-corrective thinking.”

(Richard Paul and Linda Elder)
Implications for learners:

1. You have to **do something decisive** in order to see yourself thinking.

2. You have to take responsibility for what you do and what you learn from it.
Critical Thinking is more than reasoning skills!!!

• A self-awareness of your operating assumptions and dominant values

• A self-awareness of your thought process—of how you came up with an answer

• A self-awareness of change in your way of thinking

• Foundational: An attitude of inquiry (this can be learned!!!
What are the conditions for promoting critical thinking?

– Describe it explicitly (for your course, discipline)

– Make sure your students can describe it, too.

– Align your tests, assignments and grades with it.

– Align every class meeting; every interaction (practice).

– Be willing to change—*sometimes radically*—how you teach when students fail to develop the targeted ways of thinking (*i.e.* think critically about your own teaching).
The dilemma of many college teachers

My happiness
I like it when I get really good student evaluations.
I like that students enjoy my course...that I’m a popular teacher
I enjoy it when students come to me to get me to explain things.
I get pleasure out of lecturing—it’s a chance for me to really demonstrate my expertise.

My sadness
Sometimes my students resist when I push them to think for themselves, rather than spit back facts.
My students seem helpless, even when I give them explicit instructions.
I am often disappointed by students’ performance on exams, even after they seemed to “get it” in class.
Many of my students (even juniors and seniors) seem to be doing fine until they have to express their ideas in writing.

Could there be more than a coincidental relationship between my happiness and my sadness?
Our starting point:

Promoting our own critical thinking and reflection as a model for promoting it in our students.

Let’s explore analytically and critically a few elements of the teaching-learning process...
The question:

Which student study and preparation practices lead to highest performance on a simple test of knowledge (basic comprehension and recall)?
A formal study conducted by a professor of Psychology (McKelvie) from U Michigan....

- Beginning psychology course
- 200 “normed” students
- All students covered the exact same material
- All students took identical exam
- 5 Groups of students; 5 different preps
The Experiment

_____**Group A:** Listened to the lecture, did not take notes, and took the exam one week later.

_____**Group B:** Did not listen to the lecture, were given a copy of professor’s lecture notes, reviewed notes before taking exam one week later.

_____**Group C:** Listened to the lecture, took notes, reviewed notes before taking exam one week later.

_____**Group D:** Listened to the lecture, took notes, but did not review notes before taking the exam one week later.

_____**Group E:** Did not attend lecture, did not receive a copy of the lecture notes, were not enrolled in the course, had never taken the course, and took the exam cold.

*(Adapted from the Canadian Journal of Behavioural Science, Vol. 18, no. 1)*
Work alone:

Rank the performance of the student groups from best to worst:

1 = Best  
5 = Worst

WRITE DOWN YOUR RANKINGS
on a piece of paper
Work in groups at your table. As a group now combine your thinking to reach consensus on your prediction.

1 = Best      5 = Worst

Record your team’s final answers on the separate sheet of paper *(one set of answers only)*
Based on your team’s answers, what are your dominant assumptions about what students need to do for basic comprehension and retention of information?
Let’s see how you ranked the students
**Time out!!**

Facilitating critical thinking

1. Task (serious but playful): Start with **action**. Ask for a **decision** requiring students to work with incomplete information (e.g., interpretation; prediction; assessment of new situations)

2. Structure the decision as a “choice” among limited options

3. Encourage an analysis of the decision (by asking for consensus on the decision among several students).

4. Make explicit the assumptions driving decisions.

5. Provoke reflection: Compare students’ thinking with actual results; look at additional information, test assumptions
The Experiment

_____Group C: Listened to lecture, took notes, reviewed notes before taking exam.

_____Group B: Did not listen to lecture, were given professor’s notes, reviewed notes before taking exam.

<table>
<thead>
<tr>
<th>Differences between these groups were statistically insignificant:</th>
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<tbody>
<tr>
<td><strong>Group A:</strong></td>
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<td><strong>Group D:</strong></td>
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<tr>
<td><strong>Group E:</strong></td>
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</tbody>
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In light of this experiment, which of the following practices proved more or less important for retaining information and performing well on the exam:

- Listening to the lecture
- Attending class
- Listening to the lecture and taking notes
- Taking time off to let memory do its work
- Reviewing notes before an exam
- Having accurate notes to study
Time out!!
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5. Provoke reflection: Compare thinking with actual results; look at additional information

6. Make explicit any changes in thinking
Attitude development is the goal

1. Frequent practice making decisions (ACTION and explaining or defending them. (takes time—see Eric Mazur, Richard Felder)

2. Group/Team-based tasks that allow candid analysis without the presence of an authority (see Michaelsen and Fink)

3. Public comparisons of group decisions to model critical reflective process (see Michaelsen)

4. Challenging tasks (and grading schemes) that do not overly penalize failures for experimental thinking
Speculative (predictive) inquiries that model and foster critical thinking
(“educated guess” BEFORE coverage)

Psychology: Which of these practices is most likely to aid memory?

Art: Which of these 4 artists is mostly likely to have painted this picture. Why?

Chemistry: If you add Ajax Detergent to this solution, which of the following is most likely to happen? Why?

History: Which of the following persons is the most likely author of this document?

Literature: Based on this paragraph, what will be the thematic function of this character in the narrative? (pattern prediction)

Culinary: Which of the following substances will alter the density of the product?

Why? Why? Why?
The role of incomplete information

• Gaps in information force judgments that uncover students’ assumptions.

• Observing how students fill in gaps allows us to assess their thinking process and not merely the accuracy of their answer.

• **ERROR IS ESSENTIAL in becoming a critical thinker**
The **frustrating truth** that even our best students are not aware of and that we forget to help them see:

Authentic Critical Thinking begins when the information available is not sufficient for making a clear determination of what to do in a given situation.

Critical Thinking occurs during the discomfort of being forced to decide **even though you cannot be sure of the best way to proceed**.
Some critical thinking challenges for instructors, prompted by McKelvie’s study

1. What’s the real function of a lecture? A reading assignment?

2. If McKelvie’s data are valid, and it doesn’t matter much whether students read or listen to a lecture on the same content, what are the implications for the design and sequencing of learning activities?

3. What’s the best use of class time?

4. How can we ensure that ALL students cover the lecture material on their own outside of class, so class time can be used for more ambitious goals?

5. ???
Thinking Critically about the Teaching of Critical Thinking

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