

2015-05-12

Not What to Think But How to Think: Critical and Reflective Thinking in University Education

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<http://hdl.handle.net/1880/50583>

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NOT WHAT TO THINK, BUT HOW TO THINK:
CRITICAL AND REFLECTIVE THINKING
IN LIBERAL EDUCATION

U of C Conference

May 2015



NOT WHAT TO THINK, BUT HOW TO THINK: CRITICAL AND REFLECTIVE THINKING IN (LIBERAL) EDUCATION

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4 Pillars of Liberal Education

- Breadth
- Connections across Disciplines
- **Critical Thinking Skills**
- Education for Citizenship



What is Critical Thinking?

- formulating good questions
- collecting and evaluating data
- analyzing and synthesizing ideas
- logical and evidence-based reasoning
- carefully examining assumptions and biases



Goal of (Liberal) Education

We teach students

HOW to think

not what to think!



PROCESS

versus

CONTENT



Metacognition:

“Thinking about Thinking”

(Flavell, 1970s)

Metacognitive : Knowledge
 : Regulation



“gain a level of awareness *above the subject matter* [and] also think about the tasks and contexts of different learning situations and themselves as learners in these different contexts.”

(Nancy Chick, Metacognition)

A “*conscious* meta-strategic level of H[igher] O[rder] T[hinking]”

Zohar & David, 2009



Metacognition

Good metacognitive skills are linked to:

- increased ability to transfer or adapt learning
(Bransford, Brown, & Cocking, p. 12; Palincsar & Brown, 1984; Scardamalia et al., 1984; Schoenfeld, 1983)
- success in critical thinking and problem solving
(van Gelder, 2005; Pintrich, 2002; Scruggs et.al., 1985)
- intelligence in general
(Sternberg, 1984, 1986a, 1986b)
- enhanced academic performance

(Borkowski, Carr & Pressley, 1987; Garner, 1990; Carr, Kurtz, Schneider, Turner



“Teaching” Critical Thinking and Metacognition

- We can't directly “teach” these - not content
- We can facilitate their development
- through structured opportunities to practice them
- and actively reflect on them.



Van Gelder's Lessons:

- Critical thinking is hard!
- It takes lots of practice!
- Transfer of skills must be practiced.
- Need to make skills/transfer explicit.



Cognitive Strategy Development

Halpern, 1990:

There are identifiable cognitive strategies, previously believed to be utilized by only the best and the brightest students, which can be taught to most students.



Problems and Puzzles

Developing 21st century skills:

- problem solving
- critical thinking
- communication
- collaboration



Liberal Education 2200

- 215 students over 5 semesters
- Roughly half male, half female
- Diverse majors, faculties, reasons, goals.
- ongoing research project, n=185.



The Classes

Primarily non-lecture, hands-on, interactive:

- Present a problem
- Students work individually or collaboratively
- Instructors & TAs circulate to discuss, prompt, question, encourage
- Whole class “debrief” to share challenges, interpretations, strategies, and solutions
- Community of Inquiry: all learning together



Sample Puzzle

Four couples are formed from
Kaylee, Sarah, Jenn and Anne,
and David, Will, Sam and Ben.

Will is Jenn's brother. Jenn and Ben and dated
for a while, but then Ben met his present wife.
Kaylee is married to Sam. Anne has two
brothers. Anne's husband is an only child.

Can you match up the couples?



| NAME | KAYLEE | SARAH | JENN | ANNE |
|-------|--------|-------|------|------|
| DAVID | X | X | YES | X |
| WILL | X | YES | X | X |
| SAM | YES | X | X | X |
| BEN | X | X | X | YES |



METACOGNITIVE STRATEGIES

- discuss metacognition as a topic and strategy
- find out and discuss thinking and learning styles
- weekly “Reflection Assignments” to promote metacognitive thinking



First Reflection

Learning Style: VARK (Fleming, 1995)

Visual

Auditory

Read-Write

Kinaesthetic



Thinking Style: Gregorc (1979)

| | | |
|----------|-------|------------|
| Concrete | _____ | Abstract |
| Random | _____ | Sequential |

CR — AR — CS — AS



» USING THINKING/LEARNING STYLES in the CLASSROOM?



Student Response:

- very useful information!
- most new VARK, but not Gregorc
- but didn't know what to do with it!
- Education majors?



“the awareness of my learning style that I have gained in this class has really allowed me to understand why I have been successful at many things ... and why I have been unsuccessful in other areas.”



When I'm studying I often think now about how much I'm actually retaining and how long it's taking me to go through a certain amount of material. As I think about my learning and my ability to learn I have found that there are certain courses where I can just read through my notes and rewrite them and that is sufficient to help me learn all the information that I need to know for an exam. But other classes, I would try that same approach and would have a tough time either focusing or retaining. So now I think about why I'm having a tough time focusing or learning the material and see that the I need to go about a different way of learning the material, such as quizzing myself on topics or talking to myself and explaining it.



I am more deliberate about planning how to approach a task according to my strengths. I do this particularly when planning for an essay or studying for exams. I also evaluate my own success by being aware of my own expectations toward my goals. Due to my being more aware of my thinking and learning styles, I think I have learned how to maintain motivation a bit more than I previously did.



I think knowing my learning styles has helped me. I found I'm more aware of how I go about studying or how I record notes in class. For example, in one of my classes my professor posts all his notes online prior to the lecture so we're able to follow along and listen. Although I don't need to write anything I find I still write out all the points and any additional information discussed in class; because that is how I retain information; versus simply listening to the lecture. The learning styles really helped me realize I like both ways to process new information.



Other Reflection Questions

- use of metacognition?
- preference for solo vs joint work in class?
- transfer of skills?
- the role of problem-solving in your major?
- what (kinds of) puzzles have taught you the most?



Reflection on Metacognition

- toolbox of strategies, which to use when
- learning to go more slowly - think & plan more
- the importance of open mind, changing point of view
- the value of making and learning from mistakes “I also thought the course taught you to learn from your mistakes, like if that didn’t work, don’t stop there, find out why or use that to help try again.
- improved communication skills - careful descriptions



Metacognition has shown me other things like I absorb material best when reading in silence, but I write best when listening to music. Things like this I hadn't realized until I started to think about how I was thinking.



I think the methods that I have learned about in this class in terms of thinking about my own cognition have been very useful in my research. Thinking about the way that I think helps me to come up with different ways of approaching the problems of experimental design, statistical analysis approach, and follow-up studies. Lately, I have begun to write down my thought process for why I am doing a specific form of analysis over another. This has helped me to come up with new variables to measure that either I did not think would be relevant to look at, or simply was not addressed in my research question(s).



It really makes me think about explaining the solution to the problem from the perspective of a teacher. I think this makes me more cognizant of the critical reasoning involved in problem solving. In addition, it teaches me how to essentially explain things to myself, and as result I become more cognizant of my thinking processes and the means by which I best comprehend problem solving.



Transfer of Skills?

Do skills from solving artificial puzzles
transfer to academic skills?

83% say YES!



Transfer of Skills

- time management, work load
- hypothesis development and testing
- use of logical reasoning
- writing papers, taking notes, studying
- preparation for teaching careers.
- learning to carefully understand a problem before plunging in
- taking time to understand subtleties and to pick out relevant versus irrelevant information.



“I also noticed that I rely heavily on deductive reasoning in all aspects of my life. I think that being aware of my own thought processes has really helped me in writing papers, taking notes, and studying.”



“being able to explain efficiently how to solve a problem is very similar to how a strong essay proves its thesis”

“the critical thinking skills are also applicable to the processes that go into the analysis of a work and the logical development of an argument.”

“[I] had the easiest time getting through this semester and studying and everything in all of my other courses and I think that it really came from what I was doing in here.



Problem Solving in Various Majors

Response to:
Problem Solving is Important in My Major

| <i>Pre - Mean</i> | <i>Post Mean</i> | <i>P-value of Paired T-test</i> |
|-------------------|------------------|---------------------------------|
| 3.58 | 4.03 | 0.001 |



Stages of Learning?

LBED 1000 and 1500:

- Thinking & Learning Styles in intro courses.

LBED 2000:

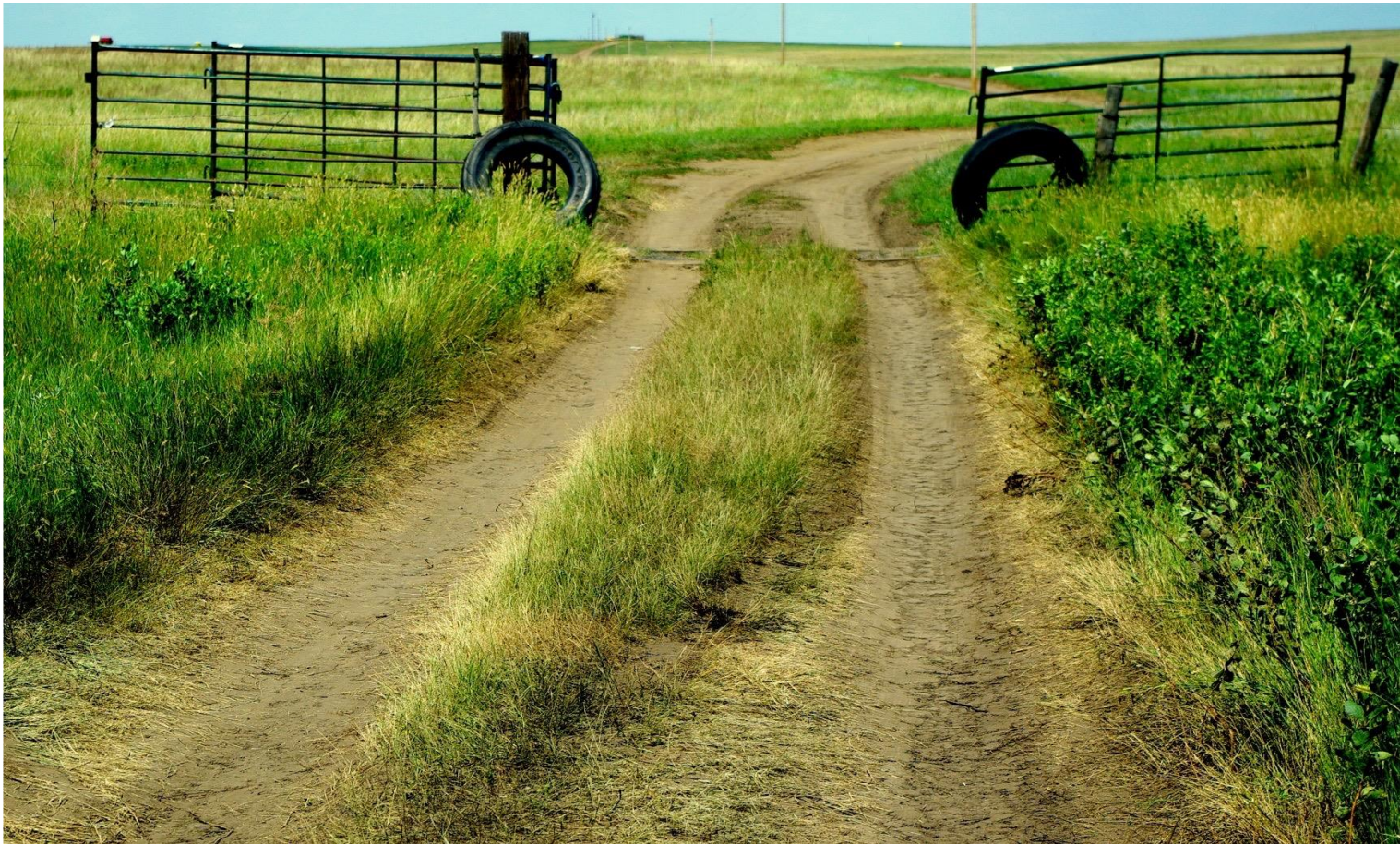
- “Metacog Blog” used by Bruce Mackay

LBED 2200:

- 2nd year credit, but now 85% are 4th year students!



Metacognition: a Threshold Concept





Threshold Concepts

Threshold Concepts are:

1. Irreversible
2. Boundary Defining
3. Integrative
4. Initially Troublesome
5. Transformative

(Meyer and Land, 2003)



What I find interesting is that I think I have always used metacognition, I just was not aware that I was using it until taking this class. I should not say “always” because I know that my first year of university was a struggle when it comes to learning and studying. I think knowing about my learning and thinking styles prior to my first year would have been hugely beneficial. That being said, being in my last year, I know my strengths and weaknesses by now. I know what strategies cater to my strengths. I think that this class should be mandatory for first years in their first semester. Learning about metacognition has made me aware of what I am doing and what I should have been doing my first year.



Conclusions

- Meta-teaching?
- The development of metacognitive skills is important in critical thinking!
- and is a threshold concept in (liberal/university) education.
- A liberal education provides a structured opportunity to cross this threshold.



» THANK YOU



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