REVIEW OF
LEARNING TO THINK: DISCIPLINARY PERSPECTIVES
BY JANET DONALD. JOSSEY-BASS, 2002

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Learning to Think: Disciplinary Perspectives by Janet Donald is a necessary and fascinating book for anyone teaching in one of the disciplines (or a related discipline) discussed—well worth the $39.00 from Jossey-Bass (http://www.jbp.com) even though you read only the chapter for your discipline. Chapter 1 describes the methodology used to study the aims, methods, and thinking practices of eight disciplines. Chapter 9 closes the book with strategies for helping students develop intellectually. Chapters 2 - 8 examine in nine major disciplines how professors want students to think, how students actually think, the difficulties students encounter in thinking, and the approaches likely to promote student learning. Based on 25 years of research, the book reports professors' and students' perceptions of the kind of thinking needed in the discipline (they differ), how student thinking develops in various disciplines, and what practices hinder or help that development. Donald and her associates investigated four-year undergraduate institutions in the U. S., Canada, and Australia; two-year colleges were not included.

The eight disciplines were chosen because they represent a variety of characteristics. Donald describes them as follows:

- Physics. Prototypical, hard, pure, nonlife, paradigmatic discipline
- Engineering. Hard, applied, concrete, nonlife discipline
- Chemistry, biological sciences. Pure, nonlife, life disciplines
- Psychology. Range of hard to soft subareas; range of pure to applied; life, young discipline
- Law. Socratic, ancient discipline
- Education. Comprehensive, applied, metadiscipline
- English literature. Interpretive, divergent, critical discipline (p. 29)

In general, Donald finds these methods and modes of inquiry across disciplines:

- Hermeneutics: construction of textual meanings (English literature)
- Critical thinking: examining assumptions and seeking evidence (English literature)
- Problem solving: includes critical thinking and also implementation and testing (physics, engineering)
- Scientific method: "universal standards for knowledge claims, common ownership of information, disinterestedness and integrity in gathering and interpreting information, and organized skepticism" (p. 24) (the hard sciences)
- Examine expertise: Rely on experts who "have a sense of the context, select the appropriate information, recognize organizing principles, and verify their inferences" (p. 25) (physics, education, and English literature)

What these highly different methods of inquiry have in common is six thinking processes that Donald observes in all eight disciplines:

- Description: of context, conditions, facts, functions, assumptions, and goals
- Selection: of relevant information and critical elements
- Representation: organizing, illustrating, and modifying elements and relations
- Inference: drawing conclusions, forming propositions
- Synthesis: composing wholes from parts, filling gaps, developing course of action
- Verification: confirming accuracy and results, judging validity, using feedback

Donald's approach to disciplinary thinking reinforces the broad definition of thinking used in the *Handbook of Critical Thinking Resources* for the Year of Critical Thinking: "Critical thinking is defined as good thinking needed by practitioners in the discipline: accurate, relevant, reasonable, rigorous—whether it be analyzing, synthesizing, generalizing, applying concepts, interpreting, analyzing, evaluating, supporting arguments and hypotheses, solving problems, or making decisions." Donald emphasizes that improvements in how students think will come from the specific thinking processes needed in the discipline.

Sandwiched between the opening and closing general chapters are seven specific chapters about thinking in eight disciplines (chemistry and biology are combined in one chapter). Each chapter uses the same basic outline to examine how students learn to think in those disciplines, where students have difficulty, and what is helpful to their learning:

- The disciplinary context
- Students' experiences learning the discipline (pointing out where professors' and students' perspectives differ)
- The learning task in the discipline
- The development of six thinking processes in the discipline
    - Description
    - Selection
    - Representation
    - Inference
    - Synthesis
    - Verification
- The challenge of instruction in the discipline, including the approach needed to learn successfully
- The disciplinary perspective

In chapter after chapter describing thinking in the various disciplines, one sees that students tend to take a surface approach to learning, rather than using strategies that lead to deep learning. Ironically, it is often the professors' methods of teaching and assessing that promote students' use of surface learning study methods rather than strategies that promote deep learning.

The concluding chapter, titled "Learning, Understanding, and Meaning," compares the thinking and validation processes across disciplines. According to Donald, "The different validation

processes used in the disciplines show a trend in where authority resides—from the objective empirical to peers. In more structured disciplines [i.e. physics, engineering, chemistry, and biology], evidence is matched to theory. Psychology occupies a middle position, where empirical testing and interrater reliability are both used as proof. Further into the human sciences, proof rests in evidence that will convince an authority in law, or test results in education, or in internal consistency rendering a work plausible in English literature" (p. 282).

What can be done to helping students develop intellectually in their disciplines? Donald recommends employing strategies at three levels: institution, faculty, and students themselves.

- The institution can provide a supportive learning community
  - "The primary reason for learning communities is that they promote relationships and provide a psychologically manageable environment" (p. 289)
  - "Department colloquia in which members talk about their research to others
  - "brown bag lunches at which professors and students debate important issues
  - "research teams that include students in collaboration on specific projects
  - "first-year seminars that introduce students to the educational context more generally" (p. 290)
  - "Capstone courses, creating higher expectations, and enhancing student satisfaction with the learning environment" (p. 290)
  - Service learning

- How faculty can promote higher-order learning
  - Explain the process of scholarly inquiry in the discipline
  - Engage students in the process of scholarly inquiry in the discipline
  - Show how the discipline validates knowledge
  - Show how the expert in the discipline functions
  - Establish learning outcomes in individual courses, and include higher order thinking outcomes
  - Assess learning outcomes, including higher order thinking outcomes (students learn according to how they are assessed)
  - Don't grade on a curve
  - Employ active learning strategies
  - Use new media and technology in a realistic context
  - Monitor where students are having trouble learning and provide feedback

- What students can do to become autonomous and deep learners in their discipline
  - Consciously adopt course learning outcomes as their learning goals
  - Engage in active learning
  - Use study strategies that promote deep learning
  - Self-assess their own learning and study strategies

You can find other book reviews and helpful articles for accomplishing the strategies Donald recommends for faculty and students at the Reasoning Across the Curriculum web site at http://academic.pgcc.edu/~wpeirce/MCCCTR/.