Resources on Critical Thinking
University of Indiana, Bloomington
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Allen, Robert D. "Intellectual Development and the Understanding of Science: Applications of William Perry's Theory to Science Teaching."
Science students often experience difficulties as a result of their inability to see that multiple interpretations of the same data can coexist. Perry's scheme helps show that such students are not lazy, but rather that their perceptions are limited by their stage of development. Understanding the different stages may help science teachers consider the best ways of presenting material in order to help students make the transition from one stage to the next.

Arons, Arnold B. "'Critical Thinking' and the Baccalaureate Curriculum." *Liberal Education* 71.2 (1985): 141-157.
First asks, What is involved in critical thinking? Answers: Asking "how do we know? What is the evidence?" Being aware of gaps in knowledge. Distinguishing between fact and conjecture. Distinguishing between an idea and the name of that idea, and providing definitions. Looking for (hidden) assumptions. Performing hypothetico-deductive reasoning. Knowing inductive and deductive reasoning. Intellectual self-reliance. Being aware of own thinking process. Then discusses why one should bother with critical thinking, bemoans the lack of it in American students, and discusses how to increase or decrease it in students.

Baker, Paul J. "Learning Sociology and Assessing Critical Thinking" *Teaching Sociology*. 8.3 (April 1981): 325-63.
Reviews works of philosophers, educators, and sociologists who have examined critical thinking as central to the learning process. Suggests 3 strategies to improve the sociology teacher's capacity to assess critical thinking: a survey of existing instructors, development of analytic tools to assess existing test items, and teacher-developed evaluation materials.

Bean, John. "Helping Students Read Difficult Texts." *Engaging Ideas: The Professor's Guide to Integrating Writing, Critical Thinking, and Active Learning in the Classroom*. San Francisco: Jossey-Bass, 1996. 133-147.
Instructors often note that poor reading and poor writing are interlinked. Reading difficulties may stem from a variety of causes--ten are listed here--and understanding the causes can help instructors devise strategies to help students read more effectively. A variety of suggestions for discussing more effective strategies are given, along with some guidelines in how to construct assignments that require students to employ better reading strategies.

Berthoff, Ann. "Speculative Instruments: Language in the Core Curriculum." *The Making of Meaning: Metaphors, Models, and Maxims for Writing Teachers*. Montclair, NJ: Boynton/Cook, 1981. 113-126.
Claims that teaching writing is teaching critical thinking. 3 points about this relationship: observation is central to all disciplines, and learning to observe is learning to think critically; learning terms of art is learning concepts of a field; all disciplines use rhetorical ideas of invention and disposition (organization). Discusses 4 uses of language in all disciplines: speaking, hearing, reading, writing. Can use writing to relate other aspects of language use in a course together (e.g. to relate lectures to texts).

Brand, Manny. "Toward a Better Understanding of Undergraduate Music Education Majors: Perry's Perspective." *Bulletin of the Council for Research in Music Education* 98 (1988): 22-31.
Music teacher educators often become dismayed when their students fail to demonstrate the type of intellectual engagement with the topic that the educators expect. The Perry model of intellectual development, however, helps to explain the different stages that students move through as they become incorporated into the academic community, and examples of these stages are sketched out. Music teacher educators may want to consider that their students' responses will, in some ways, be restricted by their students' stage of development. Therefore, music teacher educators may want to plan their courses in such a way as to foster transitions between the stages.

Brouwer, Peter. "Hold on a Minute Here: What Happened to Critical Thinking in the Information Age?" *Journal of Educational Technology Systems* 25 (1996-97): 189-197.
Although information technology (IT) is often touted as a means of improving the quality of teaching and learning, as well as enabling universities to offer more and better distance learning courses, IT also offers the potential for

information overload. Educators need to teach information literacy so that students are better able to negotiate the amount and the quality of the information they receive. This type of literacy will enable students to make the distinction between information and knowledge.

Bruffee, Kenneth. "Constructive Reading." *A Short Course in Writing,* 4th ed. New York: HarperCollins, 1993. 147-187.
In order to write well, students need to learn to read well. By reading constructively, students learn to recognize how meaning is created in a text. This selection offers a series of suggestions for getting students to read constructively, including using a descriptive outline--an outline that makes the distinction between a paragraph's content and its rhetorical purpose.

Bruffee, Kenneth A. "Writing and Reading as Collaborative or Social Acts." *Sourcebook for Basic Writing Teachers*. Ed. Theresa Enos. New York: Random House. 565-574.
Collaborative learning, as evidenced by the social nature of language use, is vital to the writing process. Insofar as writing is a type of "talking" to a reader in a coherent fashion, writing uses language that emerges from a community's experiences as a means to communicate to that particular community. Entrance to the community is partially dependent upon being able to demonstrate competence within the specific discourse, which in turn implies that the writer has internalized the language conventions of that community in order to think about the topic--a type of thinking that involves what Vygotsky would call internalized social speech. That the writer often works alone fails to detract from the social nature of the act because the writer still internalizes the collaborative exchange within her imagination as part of the writing process.

Carpenter, C. Blaine, and James C. Doig. "Assessing Critical Thinking Across the Curriculum." *Assessing Students' Learning*. *New Directions for Teaching and Learning* no. 34. Ed. J.H. McMillan. San Francisco: Jossey-Bass, 1988.
Defines critical thinking. Discusses several standardized tests to assess critical thinking. Then outlines efforts to define, assess, and teach/strengthen critical thinking at several colleges and universities.

Carr, Kathryn S. "How Can We Teach Critical Thinking?" *Childhood Education* 65 (1988): 69-73.
Although most people recognize the need for critical thinking skills, the teaching of those skills is often divorced from content. As a result, critical thinking programs are often unsuccessful. A better program would integrate the application of critical thinking skills into the learning of content. Carr offers a review of various types of thinking skills activities--based upon Bloom's Taxonomy of Cognitive Domain--applied to content areas.

Ellis, Edwin S. "Integrating Writing Strategy Instruction with Content-Area Instruction: Part II--Writing Processes." *Intervention in School and Clinic* 29.4 (1994): 219-228.
Integrated Strategies Instruction Model (ISI) integrates learning strategy instruction with content-area instruction. One part of this model uses writing as a means to get students to think about and apply their content area knowledge. Special attention is given to understanding the writing problems of ineffective writers at the secondary level, especially students with mild learning handicaps. Students are introduced to an executive strategy which uses recursive thinking in order to solve problems, and then taught how to integrate the strategy into a written format. Studies indicate that this method of instruction is successful at improving student performance.

Gleichsner, Jean A. "Using Journal Articles to Integrate Critical Thinking with Computer and Writing Skills" *NACTA Journal* 38.4 (December 1994): 34-35.
Gleichsner presents an assignment of writing a critical review of a refereed journal article as a way to develop critical thinking in the classroom. She describes in detail the procedure the students follow in doing the assignment and then considers the assignment's importance for undergraduates, especially in the sciences.

King, Patricia M., Phillip K. Wood, and Robert A. Mines. "Problem Structure, Tests of Critical Thinking and Disciplinary Differences: A Study of Critical Thinking Among College and Graduate Students." Manuscript. Marked "Submitted for Publication. Do not quote without permission." Version published in *RHE* 13.2 (Winter 1990): 167-186.
The authors use multiple measures of critical thinking to find out whether critical thinking ability varies by grad/undergrad, gender, discipline, and "academic ability." Results: graduate students scored higher than

undergrads, some differences that could be accounted for by academic ability and discipline. Results for the different tests differed.

Kiniry, Malcolm and Ellen Strenski. "Sequencing Expository Writing: A Recursive Approach." *College Composition and Communication* 36.2 (May 1985): 191-202.
Kiniry and Strenski draw on their experience in UCLA's writing program to describe a new approach to sequencing assignments in composition courses. They describe 8 typical tasks that undergraduate writers do in all their courses, in a developmental sequence requiring more complex skills: listing, definition, seriation, classification, summary, comparison/contrast, analysis, and academic argument. Each successive skills requires repeating and reinforcing the earlier skills. In addition, they provide sample assignments which would require varying levels of each skill.

Kitchener, Karen S., and Patricia M. King. "The Reflective Judgment Model: Transforming Assumptions About Knowing." *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning*. Ed. Jack Mezirow. San Francisco: Jossey-Bass, 1990. 159- 176.
Describes a model of the development of the ability to make reflective judgments (basically epistemology): the 7 stages people go through in their ability to make such judgments, and what influences this development. Discusses research indicating that this is a legitimate stage theory, and research on education in the different stages.

Kitchener, Karen Strohm. "Educational Goals and Reflective Thinking." *The Educational Forum* (Fall 1983): 75- 92.
After summarizing history of work on reflective thinking, discusses research on, and models of, reflective thinking and its development. Describes a 7-stage model of the development of reflective thinking ability. Discusses educational implications: reflective judgment isn't taught explicitly, or if it is epistemology is being ignored. Education might be able to help students progress through developmental stages.

Kitchener, Karen Strohm, and Patricia M. King. "The Reflective Judgment Model: Ten Years of Research." *Beyond Formal Operations III: Models and Methods in the Study of Adolescent and Adult Thought*. Eds. M.L. Commons, C. Armon, L. Kohnberg, F.A. Richards, T.A. Grotzer and J. Sinnott. NY: Praeger. 2-29.
Describes a 7-stage model of the development of reflective judgment. Relates reflective judgment to Piaget's formal operations. Describes how it is determined what stage a person is in, and summarizes research on the model, specifically research relating age and educational level to stage.

Kloss, Robert J. "A Nudge is Best: Helping Students through the Perry Scheme of Intellectual Development." *ournal of College Teaching* 42.4 (1994): 151-158.
The Perry scheme of intellectual development is one of the few schemes with practical classroom applications. Drawing upon his ten-year experience of incorporating the scheme in his pedagogy, Kloss describes the different stages and offers concrete suggestions on how to challenge students to move from their initial dualist stage to commitment in relativism.

Law, Joe. "Critical Thinking and Computer-aided Instruction in Sociology 200." *Writing Across the Curriculum*. 8 (March, 1998): 1,3.
Instructors of large classes often have difficulty in knowing whether the students have read and understood the text. One instructor requires her students to take weekly computerized tests over the reading. Outside of the tests, the instructor also requires a research project in which students must keep field notes of their observations of a sociological concept in process.

Law, Joe. "Uncritical `Critical Thinking': Reexamining Current Paradigms." no citation. Possibly part of a workshop.
The problem with current instruction in composition in critical thinking is that it separates factual content from thinking, and tends to treat critical thinking as if it were a mechanistic skill. Current approaches may deal with formal/informal logic issues, but shows examples of logic fallacies, rather than the thought processes which led to them. Overviews the major approaches to teaching critical thinking and gives suggestions for overcoming their limitations.

McPeck, John E. "The Meaning of Critical Thinking." *Critical Thinking and Education*. New York: St. Martin Press, n.d. 1- 23.
Defines critical thinking as thinking with scepticism about a subject or field. Requires that the thinker have the skills associated with practioners in that field. Critical thinking can include certain aspects of problem solving and various skills. Argues that critical thinking can be taught using drills and practice, but not with just any drills--only drills that encourage the use of critical thinking. Students must be motivated to use their critical thinking skills.

Moll, Michael B., and Robert D. Allen. "Developing Critical Thinking Skills in Biology." *Journal of College Science Teaching* (November 1982): 95- 98.
Describes efforts of biology faculty at West Virginia University to teaching critical thinking skills to introductory biology students. Uses video and discussion during class to enable students to apply concepts as they learn them; derive concepts from observations and data; and practice scientific processes. Presents assessment of the program, including data on improvement in students' critical thinking skills pretest/posttest.

Nelson, Craig E. "Critical Thinking and Collaborative Learning." *New Directions for Teaching and Learning* 59 (Fall 1994): 45-58.
Nelson introduces key aspects of the pedagogy of critical thinking and their relationships with collaborative learning. He suggests that it is important to learn how to explain why incorrect responses occur, in addition to providing the disciplinary expectations of a subject. Students need to move beyond a dualistic approach (yes/no answers) or a multiplistic approach (all answers are equally valid) to one of contextual relativism, where they learn the criteria for judging alternatives in a specific discipline. Nelson includes some examples of in-class exercises to accomplish this level of critical thinking.

Nelson, Craig E. "Skewered on the Unicorn's Horn: The Illusion of Tragic Tradeoff Between Content and Critical Thinking in the Teaching of Science." Materials for IU Teaching Resources Center workshop, February 4, 1991.
Presentation by Craig Nelson on the Perry scale, critical thinking in science and how to foster it, and how to use small group discussion fruitfully.

Nelson, Craig E. Fostering Critical Thinking and Mature Valuing Across the Curriculum: Comments & Conversation" Work in progress
This document is an outline of a workshop presented at Indiana University Bloomington. It covers four modes of thinking ranging from fact recognition to contextual reasoning, with different transitional stages listed. Nelson includes some brief references.

Olson, Carol Booth. "The Thinking/Writing Connection." *Developing Minds: A Resource Book for Teaching Thinking*. Ed. Arthur L. Costa . Alexandria, VA: Association for Supervision and Curriculum Development, 1985. 102- 107.
Connects writing and thinking processes. Presents a lesson plan to be used at grade-school level that supposedly encourages students to use all levels of thinking (knowledge, comprehension, application, analysis, synthesis, evaluation) and all parts of the writing process (prewriting, precomposing, writing, sharing, revising, editing, evaluation).

Paul, Richard. "Teaching Critical Thinking in the 'Strong' Sense: A Focus on Self-Deception, World Views, and a Dialectical Mode of Analysis." No citation. 2-7.
Discusses how not to teach critical thinking (as a set of technical skills without larger contextual issues), and how to teach critical thinking. Argues that critical thinking needs to be taught in a dialectical or dialogic way--as arguments in relation to counterarguments. Lists means of evaluating a course on critical thinking taught in this way, and some "basic theoretic underpinnings" for such a course. Argues that multicategorical ethical issues are ideal for teaching critical thinking.

Perry, William G., Jr. "Cognitive and Ethical Growth: The Making of Meaning" (Ed.), *The Modern American College: Responding to the New Realities of Diverse Students and a Changing Society*. Ed. Arthur W. Chickering. San Francisco: Jossey-Bass, 1981. 76-116.
A basic overview of the Perry scheme of intellectual development of college students. Also discusses some research done on the scheme, and some efforts at changing teaching.

Smith, Raymond. "Sequenced Microthemes: A Great Deal of Thinking for Your Students, and Relatively Little Grading for You." *Teaching Resources Center Newsletter*.
This article responds to a Campuswide Writing Program survey of nearly 300 faculty members about the degree of writing used in their courses. While the motivations for assigning writing varies widely, nearly all of the respondents demand writing assignments from their students, although instructors cite that the time involved in grading is a major drawback. The use of sequenced microthemes, however, allows instructors to foster critical thinking skills or other abilities in their students without adding an inordinate amount of time in grading. Smith includes two different sequences of assignments--one from his Shakespeare course and the other from a journalism course--designed to enable students to grasp important concepts and become prepared for later, more difficult work.

Slattery, Patrick. "Encouraging Critical Thinking: A Strategy of Commenting on College Papers." *College Composition and Communication* 41 (October 1990): 332-335.
Suggests types of comments that can be made on student papers to encourage critical thinking: a support response and a challenge response.

Tallman, Julie. "Connecting Writing and Research through the I-Search Paper: A Teaching Partnership Between the Library Program and Classroom." *Emergency Librarian* 23.1 (September 1995): 20-23.
This article describes the collaboration between a high school English teacher and a librarian in doing a process-oriented research project called the I-Search paper. This process allows students to define their own research topics and reflect on the strategies used to gather and organize information at each step of the process. I-Search emphasizes interpretation over regurgitation of findings. The article also includes some sample prewriting exercises and journal prompts to use with students.

Thoma, George A. "The Perry Framework and Tactics for Teaching Critical Thinking in Economics." *Journal of Economic Education* 42 (1993): 128-136.
Offers strategies for nudging student development within the Perry scheme of intellectual development. The underlying principles for these strategies rest in Craig Nelson's work on transitioning between different modes of thinking.

Thompson, Jan C. "Beyond Fixing Today's Paper: Promoting Metacognition and Writing Development in the Tutorial through Self-Questioning." *The Writing Lab Newsletter* 23.6 (1999): 1-6.
Although open-ended questions are generally preferred by composition specialists, these types of questions are particularly important within the context of tutoring students with learning disabilities. These students tend not to strategize without outside, explicit direction, but open-ended questions help these students develop metacognitive skills through active learning. Socratic discussions, outlines, and the five Ws are discussed, along with rhetorical modes. Self-cuing is another important part of this type of tutorial, especially LD students.

Turner, Michele. "Writing Across the Curriculum and Critical Thinking Skills in Nursing 414." *Writing Across the Curriculum*. 9 (May 1998): 1-2.
Describes three assignments used to develop critical thinking skills in a course entitled, "Applying Neuroscience Nursing Principles to Practice." "Development of a Concept" requires students to use journals to develop a historical review of the evolution of a neuroscience nursing concept. student-developed questions relating to the daily topic and based upon the preparatory reading, and a textbook exercise meant to stimulate students to become more critical readers as they search for outdated or inaccurate information in the assigned textbook.

"Two Ways of Approaching Cognitive and Ethical Development." Campus Writing Program. Indiana University, Bloomington, IN.
One-page summary of both Bloom's taxonomy of educational objectives and Perry's scheme. Part of a series of handouts designed for workshops.