

# Teaching Tips/Notes



## Enhancing Higher-Order Learning and Critical Thinking: A Strategy for Large Undergraduate Classes

The development of critical thinking in a learner is an iterative cognitive development process. For a course or a curriculum to be successful in promoting a high order of learning and critical thinking, teachers must employ appropriate teaching strategies that can be measured for effectiveness. Studies on pedagogical approaches on critical thinking have shown that gains in critical thinking occur with active learning methods such as reflective inquiry and analytical writing (Kaplan and Kies, 1994), peer-to-peer interaction (Smith, 1977) and class participation (Gibson, 1985). Teachers in graduate and senior-level undergraduate classes commonly include “critique of the primary research literature” as a learning strategy in course curricula. In addition to integrating a number of active learning methods, this learning strategy provides vital context to scientific and/or philosophical concepts comprising the course curriculum.

Providing context to concepts is an important part of the teaching process, particularly during the early years of higher education. However, very frequently, classes are taught at the lower order “knowledge” domain of learning (Pickford and Newcomb, 1989; Whittington, 1995). The lower-order learning with lack of context may be a reason why college students at the third-year and fourth-year levels are frequently unable to retrospectively recall important concepts vital for continuous higher-order learning. This problem also behooves introspection of teaching strategies used in large-enrollment lower-level college courses.

The critique of the primary research literature in large-enrollment lower-level college classes has not been widely discussed in the pedagogical literature. Our experience in using such a strategy has demonstrated its potential to provide students with context to scientific concepts, to build research method skills, and for students to learn at the higher orders of Bloom’s taxonomy (Bloom et al., 1956). In the following paragraphs, we describe the procedures for using “primary research literature” as a learning strategy. Emphasis is placed on important logistical and learning considerations appropriate for a large class of first-year college students.

A class lecture on a scientific topic is delivered by the instructor with textbook information providing out-of-class learning context. Towards the end of the lecture, the instructor assigns a primary research paper for student review and critique. At this stage, it is important for the instructor to provide guidance to students on areas of emphasis for critique of the research paper. It is also recommended that the instructor provide a critique sheet with 5-6 structured questions that elicit opinion and critique. Following out-of-class review of the research paper, each student submits a completed draft of the critique sheet, observes an in-class instructor-led overview presentation and participates in class discussions of the research paper. These discussions should emphasize the research method and can occur among small groups of students. Random student groups can also be asked to present their critiques to one or more of the structured questions on the critique sheet. Finally, each student can improvise on the draft critiques for submission and evaluation (Figure 1).

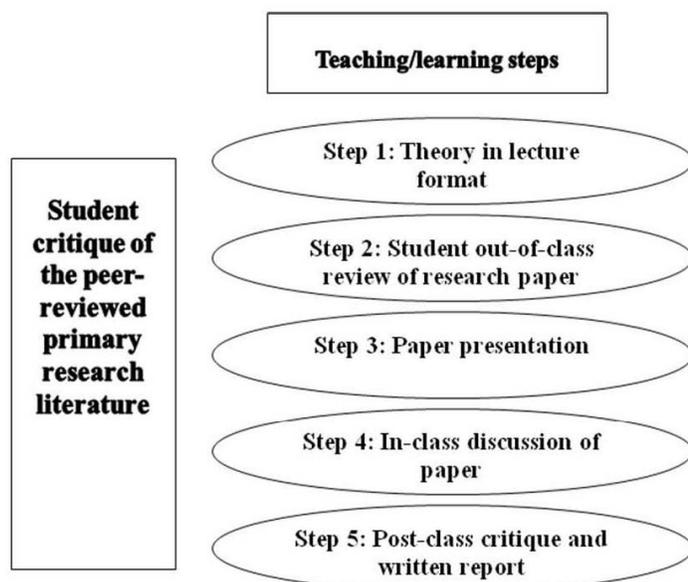


Figure 1: An active learning strategy for large-enrollment undergraduate classes

An iterative process of discussing 3 or 4 research papers during the duration of a typical college semester is recommended. We suggest the selection of relevant papers that would supplement and emphasize important concepts taught in the course. In our experience, this teaching strategy can be introduced into a course with little effort. Measurement of the critical thinking process can be done by administering a standard critical thinking test before and after the semester. Alternatively, at each stage of the critique process, students may place themselves on a Bloom's taxonomy instrument for a particular scientific/philosophical concept and thus provide a basis to measure learning.

#### **Literature Cited**

Bloom, B. S., M. D. Engelhart, E. J. Furst, W. H. Hill, and D. R. Krathwohl. 1956. Taxonomy of educational objectives, the classification of educational goals. New York, NY: David McKay Company.

Gibson, H.W. 1985. Critical Thinking: A communication model. Diss. Abstr. International 46 (11):3235A.

Kaplan, E.J., and D. A. Kies. 1994. Strategies to increase critical thinking in the undergraduate college classroom. College Student Jour. 28(1):24-31.

Pickford, J. C., and L. H. Newcomb. 1989. Relationship of cognitive level of instruction to students' cognitive level of achievement. NACTA Jour. 33(2): 56-59.

Smith, D.G. 1977. College classroom interactions and critical thinking. Jour. of Educational Psychology 69(2):180-190.

Whittington, M. S. 1995. Higher order thinking opportunities provided by professors in college of agriculture classrooms. Jour. of Agricultural Education 36(4): 32-38.

Naveen Chikthimmah, John Ewing and Rama Radhakrishna  
The Pennsylvania State University