

CPR™ AND THE MOLSCI PROJECT: WEB-BASED WRITING, PEER REVIEW, CURRICULUM DEVELOPMENT, AND DISSEMINATION

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Scientists must write. Most science educators readily admit this fact, but few incorporate technical writing into their courses. Calibrated Peer Review (CPR)™ software brings technical writing and peer review broadly to the educational experience. CPR has special value in large courses. Peer review provides a valuable tool and enhances the "scientific writing experience" in undergraduate education (Koprowski, 1997). CPR goes beyond simple peer review. Students must be calibrated before they review their fellow students' work. This calibration assures a base-level competency.

CPR achieves several key educational goals. CPR provides ample opportunity for regular student writing about science and about issues that impinge on science. Students write in a professional context-publication. Students receive feedback on the content and clarity of their writing, and they read exemplars of good scientific writing on the same topics about which they have written. Regular critiques of student writing show students what matters in peer review of manuscripts and proposals. In addition, students learn crucial skills such as abstracting, reading for content, reviewing, and self-evaluation. CPR leads students to think more carefully about important areas of molecular science and encourages students to ponder ethical, moral, and policy issues that impinge on molecular scientists.

Calibrated Peer Review comprises a set of network tools that manage all aspects of the peer review process. CPR can manage the entire process without instructor intervention, and it enables the instructor to enter writing assignments. Even the latter process minimizes faculty work. CPR provides a tool for entering new writing assignments with the necessary calibration documents and review questions. The program manages all student documents, provides peer review documents, enables self-review, and creates both student and instructor reports. If an instructor wishes, he or she can use writing assignments from the library of writing assignments that CPR provides. Currently, the library comprises fifteen assignments, and we are constantly adding new assignments to the library. Some of the assignment topics include: the chemistry of vision, the importance of symmetry, the moral, ethical, and policy decisions that arise from the fact that almost every academic scientist involved in biotechnology is also involved in the commercialization of biotechnology. We expect the assignment library to contain more than 100 assignments by June 2000. These assignments will cover

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multiple disciplines and multiple educational levels.

The student begins the CPR process by submitting electronically his or her writing sample. CPR, in turn, presents the first calibration document, which the student reads thoroughly. The student then answers a series of content questions about the document. When the student has finished the content questions, he or she answers a series of simple questions about writing style. CPR then presents a second document for similar review and then a third document for review. The student then ranks each document giving one a top ranking, one a middle ranking, and one a bottom ranking. The documents are prepared so that one is an excellent example of scientific prose, one is a modest example, and one is unsatisfactory. If the student ranks the documents correctly and answers the questions sensibly, that student is considered "calibrated" for review on this subject; if not, the student is given instruction in peer review and must then repeat the calibration process. After student calibration, CPR then delivers successively three peer documents for review, and the student repeats the review process with one change. In ranking student documents, the student ranks them from 1 to 10, with 10 the highest score. Finally, the student repeats the review process for his or her own document. CPR then compares all reviews and reports the average score and the four individual rankings. The program red flags the instructor if serious disagreement among rankings exists. CPR also reports to the student how he or she did relative to other peer reviewers of the same document and how the self-review compared to peer review. At the instructor's option CPR will also report the peer reviewers' answers to the content and style questions.

What does CPR accomplish? Students gain experience in writing about molecular science. They learn to read carefully for content. They learn to evaluate critically both peer writing and their own writing. In CPR, students encounter ethical, moral, and policy issues in molecular science. Finally, CPR achieves all of these good things with little or no additional faculty work.

What does the future hold for CPR? We have made CPR available to all interested parties. The CPR web site (<http://cpr.molsci.ucla.edu/cpr/>) contains all necessary information for using CPR. We are actively expanding the library and improving the core CPR technology. These improvements will insure that CPR is more broadly available and powerful.

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REFERENCES

- Koprowski, John L. 1997. Sharpening the Craft of Scientific Writing: A Peer-Review Strategy to Improve Student Writing. *Journal of College Science Teaching* 27:133-135.