To Whom It May Concern:

This is a final report of my findings in connection with the Innovations in Education Award for the project entitled, “A Peer-Review-Based Student Model for Ill-Defined Problem-Solving,” for the period May 1, 2009 through April 30, 2010.

The goal of the project was to develop and evaluate methods to solicit peer-reviewer feedback in a structured way on conceptual issues of an assignment and to provide instructors with an in-depth report, prepared by a computational model, of how well students understand the issues. The model was to estimate a student’s understanding of issues based on multiple peer reviewers’ assessments of the author’s understanding and on the student’s reviewer feedback to other authors. The proposed project was to comprise: 1) a modification of a popular existing peer review system to solicit reviewer feedback in a structured way on the conceptual issues in the assignment, and 2) a computational student model to combine the information about issue understanding and generate an instructor’s report.

My Ph.D. advisee in the Intelligent Systems Program, Ilya Goldin, and I conducted research inquiring how the feedback that student peers give each other could be mined to inform the course instructor about student awareness of key concepts. In fall, 2009 and again in fall, 2010, as part of his doctoral research, Goldin conducted a study in Ashley’s law school course on Intellectual Property law, where students were assigned to analyze a complex legal scenario, and then give feedback on each other’s analyses.

In each year, students used a computer-supported peer review system. In 2009 students used the Comrade system (http://www.pitt.edu/~goldin/), a web-based application for peer review. Comrade can support students in exchanging feedback in any class setting, and it helps instructors understand how well students are doing. Comrade accepts students’ uploads of their assignments, auto-saves student work, anonymizes reviewer feedback to preserve student anonymity, optionally administers on-line quizzes (multiple-choice and true-false) and surveys, computes and generates visualizations of quantitative class metrics, and can be extended and customized via its object-oriented design and database-backed architecture. In 2010, students used two versions of the SWoRD system (http://www.lrdc.pitt.edu/schunn/sword/index.html), a computer-supported peer review system of my LRDC colleague, Prof. Christian Schunn.

As specified in the grant proposal, in each year we arranged for half of the students to use the computer-supported peer review system with a broadly domain-relevant reviewing rubric, focusing students in general terms on identifying issues and making rigorous legal arguments. The other half of the students used a conceptually-oriented rubric pertaining to the specific legal concepts and arguments that were relevant to the particular assignment.

While the 2010 results have not yet been analyzed, our 2009 results showed that students who used the
broadly domain-relevant rubric gave each other ratings that were strongly correlated across different reviewing criteria, and these ratings were skewed towards the high end of the rating scale. For example, students who were rated by their peers as being strong at identifying issues were also likely to be strong at making arguments about these issues. On the other hand, students who used a problem-specific rubric gave each other ratings that distinguished among the criteria of the rubric, and used a greater range of the rating scale. For example, students who were rated by their peers as arguing well about one legal issue were not necessarily likely to argue well about a different issue. We later aggregated the peer ratings into statistical summaries for each legal issue. These statistical summaries show whether, according to peer ratings, students in the class tend to score high or low on each issue. In aggregate, the statistical summaries can be computed on the fly even as a peer review exercise is in progress, yielding a computational student model that can be used by an instructor, or by an intelligent tutoring system. We were not able to show that students learned from the peer-reviewing activities nor that there was any differential effect in learning across the two conditions. The multiple-choice test for assessing learning may not have been sensitive enough to assess what the students learned, if anything, from the peer-reviewing activity.

The work has resulted in:
(1) a journal submission to the Special Issue on Redesigning Peer Review Interactions Using Computer Tools of the Journal of Writing Research entitled “Conceptually focusing peer feedback with rating dimensions” Goldin, I.M. and Ashley, K.D.

In addition, Goldin is completing his Ph.D. dissertation manuscript and hopes to defend by the end of the spring semester, 2011.

I greatly appreciate the support of the Innovations in Education Award. If I can provide any additional information, please let me know.

Sincerely,
/s
Kevin D. Ashley
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Senior Scientist, LRDC