

ME-PEER: one model for peer involvement in course assessment

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ABSTRACT

In January 1994, twelve universities joined forces in a two-year effort to develop new prototypes for the peer review of teaching. Stanford is one of the twelve participating universities. Working together, the campuses selected pilot departments in eight fields-- Chemistry, Mathematics, English, History, Music, Business, Engineering, and Nursing-- with faculty teams from these eight areas functioning as part of a cross-campus, project-wide disciplinary working group. At Stanford, the Mechanical Engineering, History and English Departments are participating in the project.

This paper discusses the procedure for peer involvement in the assessment of courses in Mechanical Engineering at Stanford. The procedure is based upon elements of good teaching practice, and on input from the instructor, students and peers. It has been "prototyped" in nine engineering courses over the past two years. Major features of the ongoing project will be summarized, including faculty attitudes and required time commitment.

Summary of the 1994-95 ME-PEER Project: During the 1994-95 academic year, a group of Mechanical Engineering faculty looked at the role that peers could play in curriculum assessment. This reflection was initiated by the larger, American Association of Higher Education (AAHE) twelve university study of peer assessment of teaching¹. The Mechanical Engineering group became known as the "ME-PEER" project, and was comprised of Ed Carryer, Mark Cutkosky, John Eaton, Ken Goodson, Tom Kenny, Larry Leifer, Sheri Sheppard, with consulting assistance by Dr. Michele Marincovich, Director of the Center for Teaching and Learning (Stanford), and Kathleen Quinlan, Ph.D. Candidate, School of Education (Stanford).

The Stanford ME-PEER group began with the goal of developing peer-review methods to assess teaching effectiveness and to document teaching scholarship for promotion and tenure purposes. Early in the formulation process the group narrowed its focus on formative assessment rather than summative assessment (Cavanagh, 1996), with the

¹The workbook *From Idea to Prototype: the peer review of teaching* (1995), and the paper by Quinlan (1996) summarize many aspects of the overall project.

objective of providing input into the improvement of teaching, as reflected in student learning behavior. The focus on peer-conducted student interviews emerged from approximately 15 hours of discussion in which the group attempted to identify the major elements of good teaching and how they might best be assessed.

The major outcomes from the 1994-95 ME-PEER project were:

- ^a *List of Issues* important in assessing teaching. Table 1 shows the issues that were identified by the Stanford ME-PEER group. This list became the basis of the student interviewing process. This table also contains the group's relative weighing of the role of student and peer input on the various issues.
- *Protocol* for peer assessment that includes peer-conducted student interviews. The product of the protocol is a reflective memo, video taped student interviews, and a summary memo. The protocol is summarized in Table 2. In the first year of the project, three courses² were evaluated using protocol.
- *Open and frank discussions* about elements of good teaching (good for both junior and senior faculty). Focus was more on the course/curriculum as a whole, rather than solely on the teacher.
- *Presentation of work* at National Meetings (e.g., L. Leifer and S. Sheppard: June '95 & '96 AAHE meetings, July '95 NSF Assessment Workshop, Nov. '95 FIE) and in publications (e.g., Sheppard et. al, 1996).
- *Continued interaction* with AAHE personnel (e.g., Dr. Pat Hutchings, Director of AAHE was a guest speaker on an assessment of engineering reform panel at FIE in Nov. '95) and faculty in the School of Education (e.g., Dean Shavelson, Profs. Jim Greeno and Lee Shulman) spoke at the Stanford Workshop on Product-Based Learning (Aug. '95).
- *Acknowledgment* of efforts by the Provost's office (Bob Weisberg).

Summary of the 1995-96 ME-PEER Project: Based upon the general satisfaction of the faculty participants in the 1994-95 project, it was decided by the ME-principals (Sheppard and Leifer) to recruit additional participants for the 1995-96 project. Four members from the first year (Sheppard, Leifer, Carryer and Kenny) elected to participate in the second year, and six additional faculty were recruited (Fruchter, Hill, Lele, Mikic, Reynolds, Widmann). The objectives of the project for the 1995-96 academic year were to further prototype and document the protocol, particularly with individuals who were not

²1994-95 ME-PEER courses:

ME112: Mechanical Systems, a senior-level undergraduate design course.

ME117/220: Introduction to Sensors, a senior level or masters level design course.

ME250: Introduction to Heat Transfer, a graduate level thermoscience course.

part of the original group who compiled the list of issues and the procedure. In addition, we hoped to get representative numbers as to how much time participation requires.

Table 1: Issues Relevant to Student Interviews. (the first five issues are based on the work of Way, 1992 and Hildbrand et al., 1971.) The numbers listed under Student and Peer Input reflect the Stanford ME-PEER group's opinion as to the relative insight (based on a total of 100) into a particular element provided by student and peer input.

STANFORD ISSUE (based upon Elements of Good Teaching)	Student Input	Peer Input
Instructor-Group Interaction Relates to rapport with the class as a whole, sensitivity to class response, and skill at securing active class participation.	90	10
Instructor-Individual Interaction Relates to mutual respect and rapport between the instructor and the individual student.	90	10
Dynamism-Enthusiasm Relates to the flair and infectious enthusiasm that comes with confidence, excitement about the subject, and pleasure in teaching.	90	10
Analytic-Synthetic Approach Relates to scholarship, with emphasis on breadth, analytic ability, design ability, and conceptual understanding. Also related to confidence as an engineer, problem solving abilities, and conceptual understanding. • as perceived by students • as perceived by peer	90 10	10 90
Organization & Clarity Relates to skill at presentation, but is subject-related, not student related, and not concerned merely with rhetorical skill. Includes concern for course design and course implementation. • Course Design • Course Management • Clarity	20 80 50	80 20 50
Putting in the Effort Relates to work done to prepare materials, lectures and learning experiences necessary to transform a curriculum design into an effective curriculum experience. Also includes timeliness and clarity of feedback to students on their homeworks, project reports, etc.	60	40
Continuous Development Relates to continuing evolution of the curriculum content and process, reflects continuous challenge and revision of the course content and process.	10	90

The major outcomes from the 1995-96 ME-PEER project were:

- more examples of the paper "artifact" from the Protocol (reflective and summary memos for each course), compiled in a form for disseminating the protocol beyond the original group. Six additional courses were reviewed³.

³1995-96 ME-PEER courses:

E14: Statics and Deformables, a sophomore-level strength of materials course.

ME112: Mechanical Systems, a senior-level undergraduate design course.

ME118: Introduction to Mechatronics, a senior-level undergraduate design course.

ME131b: Fluid Mechanics, a senior-level fluids course.

ME210b: Cross-functional rapid prototyping, a graduate level design project course.

CE222: A/E/C Engineering, a graduate level design project course in Civil Engineering.

- an estimate of faculty time needed to carryout the Protocol, as summarized in Table 3.
- the individuals involved looking differently at their colleagues, their own teaching, and at the reviewed courses, as discussed below.
- consulting services were provided to another engineering department, as that department applies the protocol to several of its courses.

Table 2: Summary of ME-PEER Protocol for peer assessment

1. Faculty form assessment teams (typically 3 or 4 faculty), looking at 1 to 4 of their courses.
2. The faculty member whose course is being reviewed (call him/her Faculty Member #1), writes a reflective memo (guidelines for reflective memo's given in *Cornell Teaching Evaluation Handbook*).
3. Faculty members #2 & #3 convene two or three groups of students (5 to 7 students per interview session) from Faculty Member #1's class to be interviewed. Interviews are held shortly after the term is over, when possible. The basis of these interviews is an expanded version of Table 1. The list of issues in Table 1 is made available to the students during the interview process. Faculty member #2 conducts the interview and faculty member #3 takes notes on student comments. In addition, the sessions maybe video taped for reference in the next stage of the process, and to serve as a calibration in the interviewing process. Video tapes are never seen by Faculty Member #1.
4. Faculty members #2 and #3 write a summary memo to Faculty member #1 , using as input the Reflective Memo written by Faculty member #1 and the notes from the student interviews, that they then present to Faculty member #1.
5. Faculty members change roles and review another class.

Overall Assessment of the Project: In parallel to the first year of ME-PEER project, Kathleen Quinlan, a PhD Candidate in the School of Education, studied the overall effect and impact of the ME-PEER project on faculty attitudes. Motivated by the larger AAHE project, which ME-PEER was part of, Quinlan aimed to review faculty members' ability to collaborate around the review of teaching. Her principle research tools were interviews of ME-PEER project participants and other faculty in the department, and observation of ME-PEER and Departmental meetings. Her major conclusions were:

- (1) The participants were impressed that the student group interviews provided much more detailed feedback than the written student course evaluation forms which are routinely completed at the end of the term. For example, for one ME-PEER participant, the feedback from students will help him as he revised the course the next time he teaches in modifying his style (which students found to be a bit too formal).
- (2) Students seemed to value being asked in a discussion-type format to reflect on their learning in a particular class, both voicing their own opinions and listening to those of others.

- (3) Most participants referred to new teaching techniques or ideas they learned from seeing what their colleagues do and hearing about these approaches from their colleague's students. More than one participant was heard to say: "I've certainly gotten some new ideas from listening to what other people do in their classes that I want to start incorporating into my teaching." In addition, participants came away with new models and processes for approaching teaching. These latter two items were particularly valued by junior faculty participating in the project, and served to revitalize senior faculty interest in teaching.
- (4) Several of the participants appreciated the opportunity to talk with colleagues in another part of the department about their teaching. The ME-PEER provided a forum for conversation that crossed division lines (the ME department at Stanford is divided into three divisions, Themosciences, Design, and Applied Mechanics, which are physically located in different buildings).
- (4) The participants approached the entire project in a collaborative manner and seemed at ease talking candidly about their teaching.

Table 3: Timing Estimates

Activity in Protocol	Estimated Time Required
(1) Reflective Memo Preparation	3-6 hrs.
(2) Setting-up Interviews * may involve visiting class, e-mail connection with students important * good to give students specific meeting time options to choose from * try to make "ordering lunch"/taping easy for peers to set-up	1-1.5 hrs.
(3) Conducting Interviews * may be 1.5 hrs. long if time is taken at being of session for students to introduce themselves	1-1.5 hrs. per interview (2 per class recommended)
(4) Summary memo * includes input from multiple interviewers.	3-6 hrs.
(5) Class time "lost" for advertising	5-15 minutes

Goals for the ME-PEER Project in the future: In the long run we hope that the ME-PEER project will become endorsed by the Stanford School of Engineering. We are convinced that is one means of creating a local teaching community where collaboration and discussion of pedagogy become part of the culture. One concern over this more general endorsement happening is that the results might eventually be interpreted in a summative manner, as opposed to the formative feedback that the protocol is intended to give. We believe that the long term viability does depend on faculty participation being acknowledged at raise, promotion and tenure times. We also wish to support others who want to explore

this form of peer assessment. The Protocol is a particularly valuable tool for mentor-mentee faculty pairs.

Over the next year we will work to recruit additional faculty participants. In the 1995-96 ME-PEER project this aspect of the project ended up being the most difficult, in large part because the department and most of Stanford, are faculty and not administration driven. We hope to use "happy" participants from the first two years of the project in recruiting additional faculty participants particularly from Applied Mechanics, which has declined to be involved in the project during its first two years.

Plans are being made to partner with a Mechanical Engineering Department at another university to broaden the range of perspectives brought to peer-review of teaching. This also brings our Proposal closer to peer review of journal papers and research grant proposals. Both aspects further our goal of establishing teaching as scholarly activity that should weight heavily in promotion and tenure reviews.

We will continue to view the approach outlined in this paper as one element in a more comprehensive curriculum assessment strategy. Leifer (1996) discusses other elements of summative and validative assessment that should be part of this complete strategy.

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