Program Review and Assessment Committee

Thursday, December 12, 2002
2:00 to 3:30 p.m.
Ingrid Ritchie, Presiding
Linda Durr, Recorder

AGENDA –

1. Approval of Minutes ..... I. Ritchie
2. PRAC Grant Report ..... K. Rennels
3. Grants Subcommittee Report ..... K. Stanton
4. Discussion of PRAC's Role/Responsibilities ..... I. Ritchie, T. Banta, J. Mac Kinnon
   Reevaluation and New Directions
   - program review
   - general education
   - assessment
   - curriculum review
   - e-portfolio

5. Proposed Policy for PRAC Leadership Changes ..... I. Ritchie, J. Mac Kinnon
6. Election ..... I. Ritchie

MINUTES –

Present: W. Agbor-Baiyee, L. Angermeier, D. Appleby, S. Avgoustis, T. Banta, K. Black, D. Boland, P. Boruff-Jones, C. Dobbs, K. Duckworth, C. Guba, L. Haas, S. Hamilton, J. Howard, K. Johnson, S. Kahn, L. Kasper, J. Kuczkowski, J. Mac Kinnon, S. Milosevich, H. Mzumara, I. Queiro-Tajalli, I. Ritchie, E. Sener, R. Vertner, C. Yokomoto

Guest: Ken Rennels, Chair, Department of Mechanical Engineering Technology

Note: Cake was served to thank committee members for all their hard work in helping to make the NCA reaccreditation visit such a success.

Approval of October Minutes (I. Ritchie)

Minutes were approved.

PRAC Grant Report (Ken Rennels)

Ken Rennels, Chair of the Department of Mechanical Engineering Technology, received PRAC funding in 2001-02 for a grant entitled *Development of Outcomes Assessment Instruments for Engineering Technology Degree Programs.* He reported to the committee the results of his work.

The Mechanical Engineering Technology (MET) and Computer Integrated Manufacturing Technology (CIMT) degree programs have been assessing student outcomes for some time, with the help of the school assessment committee, chaired by C. Yokomoto, and PRAC. When the Technology Accreditation Committee/Accreditation Board for Engineering and Technology (TAC/ABET), the accreditation bodies for Engineering and Technology, adopted new accreditation criteria, faculty found that they closely paralleled IUPUI's Principles of Undergraduate Learning; now MET has mapped the PULs to the ABET criteria.

The departments initially took the approach of evaluating the results of certification and licensing examinations that students were already taking. They soon concluded, however, that a locally developed exam would provide more useful information. For help with implementation, they requested and received both a PRAC grant and an internal grant from the School of Engineering and Technology to develop a senior-level assessment exam and a capstone course to assess student outcomes.

Using grant funds to compensate faculty who wrote exam questions, MET developed 120 multiple choice questions for an open-book format exam, administered for the first time in Fall 2001. Based on this initial experience, changes were made, and the second administration of the exam showed a substantial improvement in student scores, which account for ten percent of the final grade in the capstone. Faculty study exam results by question to identify specific strengths and weaknesses in teaching and learning of the MET major, as well as determining the extent to which exam results correlate with student grades. Department faculty members believe that this work has resulted in a more effective and informative student learning outcomes assessment program. The exam has drawn the attention of faculty from other institutions, who have consulted with the IUPUI MET and CIMT faculty in developing their own assessment instruments. The PowerPoint presentation and final grant report are available here.

Grants Subcommittee Report (K. Black)

K. Black reported that the Grants Subcommittee met to review the grant proposal from Margaret Adamek, Monique Busch, and Ann Kratz and subsequently sent a letter to Adamek listing several questions and concerns. A copy of that letter was e-mailed, along with the revised grant proposal, to PRAC members prior to this meeting. The subcommittee, satisfied that their questions had been answered, recommended that the proposal be funded. That recommendation was approved.

Discussion of PRAC's Roles and Responsibilities (I. Ritchie, T. Banta, J. Mac Kinnon)

I. Ritchie explained that the questions raised at PRAC's meeting with members of the NCA visiting team prompted her to think that now is a good time for the committee to define PRAC's roles and responsibilities more clearly. She suggested that various subcommittees be formed on the topics listed below, urging subcommittee volunteers to

discuss the topics via e-mail and/or face-to-face meetings and then to present preliminary reports at the January meeting on possible roles for PRAC in these areas. By way of example, those volunteering for the program review subcommittee might think about ways in which PRAC can be more involved in the campus program review process. The chairperson of each group is listed in parentheses after the subcommittee name.

Program review (J. Kuczkowski)
General education and curriculum review (J. McDonald)
Assessment (C. Yokomoto)
E-portfolio (S. Hamilton)

Ritchie had hoped that each of the groups could immediately convene for an organizing meeting, but time did not permit. Members present indicated on the attendance sheet the subcommittee of their choice. Those not present will still have an opportunity to volunteer for a subcommittee—the list will be circulated via e-mail to all members at a later date.

In response to a comment that some of these issues are already being considered by other University committees, T. Banta reminded the group that when the Council on Undergraduate Learning (CUL) was disbanded, the intent was to divide that group's responsibilities between the Academic Policies and Procedures Committee (APPC) and PRAC. Since PRAC was beginning its extensive involvement in preparing for the NCA visit at that time, some of the responsibilities PRAC might have assumed have received little or no attention from a campus-wide group. Now is the time to consider whether PRAC should take on some of these or other responsibilities. For example, CUL shepherded the PULs and it may make sense to have PRAC assume this responsibility. Are there other areas in which PRAC should be involved?

Banta also noted that it would be wise for PRAC to use this period, before the new Chancellor arrives, to define its role more clearly.

Proposed Policy for PRAC Leadership Changes (I. Ritchie and J. Mac Kinnon)

Ritchie distributed a draft description of the role of PRAC's leaders and asked members for comments and suggestions. "May slate candidates," in the last sentence of the last paragraph under "Roles and Responsibilities," was changed to "may suggest candidates."

Discussion focused on the following questions:

- Should the leadership be limited to full-time faculty?
- Could the leadership include part-time faculty?
- Could the leadership include PRAC members holding administrative positions?

PRAC's mission statement defines it as a faculty-led committee; therefore, some members felt that the leadership should be limited to full-time faculty. It was suggested that we might consider restricting one of the elected positions (Chair or Vice Chair) to

full-time faculty members, and allowing the other appointee to be a part-time or full-time faculty member, an administrator, or someone not holding faculty rank. All members, regardless of the type of appointment they hold, are eligible to vote on the leadership.

It was suggested that the issue may not be leadership, but membership. Banta mentioned that members are appointed by their deans and that, in most cases, schools have two representatives. The dean generally selects a full-time faculty member and an associate or assistant dean. Do we want to change our instructions to the deans about whom to appoint to the committee? Members commented that if the committee is to consider such issues as curriculum, general education, assessment, and program review, then it would be best if the membership were made up primarily of faculty.

This discussion was tabled and will continue at a future meeting.

Election

K. Johnson and M. Plummer were nominated for vice chair. Ballots were distributed and votes were counted. Results: Johnson was elected to be the next vice chair.

Changing of the Guard

Ritchie thanked the committee for the opportunity to serve as chair for the past two years and Banta in turn thanked Ritchie for her leadership and hard work. In January, J. Mac Kinnon and Karen Johnson will begin their terms as chair and vice chair, respectively, of PRAC.

Next Meeting:

Thursday, January 16
1:30 to 3:00 p.m.
UL 1126

Program Review and Assessment Committee
Membership, Leadership, Roles and Responsibilities – Draft

(Note: We might want to consider inserting the final version at the website as links under the mission statement.)

Membership

The Program Review and Assessment Committee (PRAC) is a faculty-led committee that includes two representatives from each academic and support unit. The representatives are appointed by the deans/unit heads on a yearly basis, prior to the start of the academic year.

Leadership

The leadership of PRAC is elected from the full-time faculty ranks of the committee. The elected leadership consists of a Chair and Vice-Chair who are elected by the membership at the last meeting of the calendar year. The nomination process seeks nominations from the membership, volunteers, and slated candidates.

The Chair and Vice-Chair serve a two-year term in each position. At the end of the term of the Vice-Chair, he/she rotates to the position of Chair. In the event that the Chair steps-down prior to the completion of his/her term, the Vice-Chair moves into the position of Chair. A new election for Vice-Chair is conducted if the remaining term is longer than four months.

Roles and Responsibilities

The role of the representative is to work with the leadership to accomplish the mission of the committee and to inform its school/unit of the committee's deliberations, as appropriate. At the end of each academic year, the representative (or designee in the unit/school) reports on the unit's/school's progress in assessment that was achieved during the academic year.

The role of the Chair is to provide leadership to accomplish the mission of the committee. The Chair is responsible for planning and convening the monthly meetings, making committee assignments, and providing an annual activity summary report, which is submitted to the membership and to the Vice Chancellor of Planning and Institutional Improvement at the end of the academic year. The Chair casts tie-breaking votes.

The role of the Vice-Chair is to provide support to the Chair in accomplishing the mission of the committee. The Vice-Chair is responsible for planning the monthly meetings and convening the monthly meetings in the absence of the chair, and for preparing to assume leadership of the committee.

The Chair and Vice-Chair together with the Vice-Chancellor of Planning and Institutional Improvement form the Executive Committee. The Executive Committee plans and guides the work of the committee. The Executive Committee may include other representatives in the planning process. The Executive Committee may slate candidates for Chair and Vice-Chair.

Development of Outcomes Assessment Instruments for Engineering Technology Degree Programs

Professor Ken Rennels
Purdue School of Engineering and Technology
December 12, 2002

Presentation Outline

1. Department Background
2. MET Outcomes Assessment Plan
3. ‘Graduation’ Exam Development
4. ‘Graduation’ Exam Format
5. Results and Analysis
6. Conclusions

Department of Mechanical Engineering Technology

258 Undergraduate Students

2,716 Credit Hours

11 Full-Time Faculty

(Fall 2002)

Department of Mechanical Engineering Technology

Certificates

- Computer Graphics
- CAD/CAM Systems
- Electronics Manufacturing
- Manufacturing Systems
- Quality Control

Minors

- Computer Graphics Technology

Department of Mechanical Engineering Technology

Associate of Science Degree Programs

- Computer Graphics Technology
- Computer Integrated Manufacturing Technology
- Mechanical Engineering Technology

Bachelor of Science Degree Programs

- Computer Graphics Technology
- Computer Integrated Manufacturing Technology
- Mechanical Engineering Technology

Continuous Improvement In Engineering and Technology

Assessment Committee

- Established by school in 1996.
- Headed by full Professor.
- Membership includes department chairs and faculty.
- School's Dean attends meetings.
- Represents school to campus assessment activities.
- Coordinates implementation of EC2000 and TC2K accreditation criteria.

MET Assessment Plan

1. Identify required courses that include measurable outcomes.
2. Determine courses where each measurable outcome will be assessed.
   a. Assess each major area.
   b. Assess student learning in each year.
3. Determine artifact or evidence to be used.
4. Determine evaluation methodology.
5. Establish expected level of performance.
6. Analyze the results to develop findings.
7. Feedback to curricular planning process.

MET Degree Assessment Plan

PRINCIPLES OF UNDERGRADUATE LEARNING		SPECIFIC MEASURABLE OUTCOME What will students be able to do that you will assess?	LOCATION Where is this material taught?	LOCATION Where is this material assessed?	ARTIFACTS OR EVIDENCE What will be collected and evaluated?	EVALUATION METHOD	LEVEL OF PERFORMANCE EXPECTED
1	**Core Communications and Quantitative Skills**: The ability of students to write, read, speak, and listen, and perform quantitative analysis, and use information resources and technology.	1a. Express ideas and facts in a variety of written formats.	IET 104 MET 105 MET 111 MET 141 MET 220 MET 230 MET 242 MET 320 MET 350 MET 384 MET 414 TCM 220 TCM 340	TCM 220 TCM 340	Student Writing Projects	Standardized Evaluation Forms and Assessment Team	Score of 3 on 5 point scale.
		1b. Comprehend, interpret, and analyze texts.	CGT 110 IET 104 MET 102 MET 111 MET 141 MET 142 MET 220 MET 230 MET 242 MET 320 MET 344 MET 350 MET 384	MET 220 MET 350	Final Exam	Student Learning Evaluation Analysis	80% Success Rate
		1c. Communicate orally in one-on-one and group settings.	IET 104 MET 141 MET 142 MET 220 MET 230 MET 242 MET 320 MET 350 MET 384 MET 414 TCM 370	TCM 370	Student Oral Presentations	Standardized Evaluation Forms and Assessment Team	Score of 3 on 5 point scale.
		1d. Solve problems that are quantitative in nature.	CGT 110 IET 104 IET 150 MET 102 MET 105 MET 111 MET 141 MET 142 MET 220 MET 230 MET 240 MET 242 MET 320 MET 344 MET 350 MET 384 MET 414	MET 105	Final Exam	Student Learning Evaluation Analysis	80% Success Rate
		1e. Make efficient use of information resources and technology.	CGT 110 IET 104 MET 102 MET 105 MET 220 MET 230 MET 320 MET 350 MET 384 MET 414	MET 220 MET 350	Final Exam	Student Learning Evaluation Analysis	80% Success Rate

MET Degree Assessment Plan

PRINCIPLES OF UNDERGRADUATE LEARNING		SPECIFIC MEASURABLE OUTCOME What will students be able to do that you will assess?	LOCATION Where is this material taught?	LOCATION Where is this material assessed?	ARTIFACTS OR EVIDENCE What will be collected and evaluated?	EVALUATION METHOD	LEVEL OF PERFORMANCE EXPECTED
2	**Critical Thinking**: The ability to analyze complex issues and make informed decisions from multiple perspectives.	2a. Analyze complex issues and make informed decisions.	IET 104 MET 220 MET 230 MET 384 MET 414	MET 414	Comprehensive Examination	Results Analysis by Subject Area	70% Success Rate in Each Subject Area
		2b. Synthesize information in order to come to reasoned conclusions.	IET 104 IET 150 MET 102 MET 111 MET 220 MET 230 MET 384 MET 414	MET 414	Comprehensive Examination	Results Analysis by Subject Area	70% Success Rate in Each Subject Area
		2c. Evaluate the logic, validity and relevance of data.	IET 150 MET 105 MET 220 MET 230 MET 320 MET 350 MET 384 MET 414	MET 414	Comprehensive Examination	Results Analysis by Subject Area	70% Success Rate in Each Subject Area
		2d. Solve challenging problems.	IET 150 MET 102 MET 111 MET 220 MET 230 MET 320 MET 350 MET 384 MET 414	MET 414	Comprehensive Examination	Results Analysis by Subject Area	70% Success Rate in Each Subject Area
		2e. Use knowledge and understanding to generate and explore new questions.	IET 104 MET 220 MET 230 MET 320 MET 350 MET 384 MET 414	MET 414	Comprehensive Examination	Results Analysis by Subject Area	70% Success Rate in Each Subject Area
		4b. Compare and contrast approaches to knowledge in different disciplines.	MET 414	MET 414	Senior Design Capstone Project	Standardized Evaluation Forms and Assessment Team	Score of 3 on 5 point scale.

MET Learning Assessment Tools

1. Problem Solving Skills - Student Learning Evaluation Analysis Form.
2. Written and Oral Communication - Standardized Evaluations Forms and Assessment Team.
3. Critical Thinking - Comprehensive Examination.

Course-Level Learning Assessment Tool

Student Learning Evaluation Analysis Form

Identifies Level of Problem Solving:

1. **Step-by-Step Solution Process**
2. **Determine Appropriate Solution Process**
3. **Determine Best Solution Process**
4. **Convert Real-World into Data for Problem Solution**
5. **Generating New Problem Solution Methods**

Development of the 'Graduation' Exam Assessment Tool

1. Reviewed existing certification and licensing examinations.
   a. Fundamentals of Engineering Exam.
   b. Certified Manufacturing Engineering Exam (used by Purdue MET program on Calumet campus).

Fundamentals of Engineering Examination

The National Council of Examiners for Engineering and Surveying (NCEES) manages the Fundamentals of Engineering (FE) and Principles and Practice of Engineering (PE) examinations. These examinations are used for Professional Engineering registration process with the eight hour FE examination taken during the last semester of an engineering curriculum. NCEES supplies universities with scores by subject area for their students.

Fundamentals of Engineering Examination

Unfortunately engineering technology students are not permitted to take the FE exam during their senior year in the state of Indiana. The state of Indiana also places other roadblocks for engineering technology students to take the FE exam including mathematics requirements beyond calculus and calculus-based physics requirements. Additionally, while the FE exam does cover a wide range of topics, it lacks questions in several of the required subject areas of the CIMT and MET programs, thereby making it unacceptable as an overall assessment tool.

Certified Manufacturing Engineer Examination

The examination for Certified Manufacturing Engineering and Certified Manufacturing Technologist is administered by the Society of Manufacturing Engineers (SME). The examinations cover primarily manufacturing related subject areas. At this time, feedback by subject area is not available to universities. Additionally, while these exams do cover a wide range of topics, it lacks questions in several of the required subject areas of the CIMT and MET programs, thereby making it unacceptable as an overall assessment tool.

MET and CIMT 'Graduation' Exam

2. Decision made to develop unique examinations for MET and CIMT students at IUPUI to be administered as a component of required senior design or capstone courses.
3. Funding requested by Professor Jack Zecher through School of Engineering and Technology internal grant program and by Professor Ken Rennels through PRAC grants for development of the MET and CIMT examinations.

‘Graduation’ Exam Format

1. Exam administered in CIMT 481 and MET 414.
2. Exams represent 10% of final course grade to provide a level of emphasis by students on the exam.
3. Core subject areas for each degree program identified.

‘Graduation’ Exam Format

4. Course coordinators for each core subject area hired to write exam questions.
    a. Final exam questions suggested as question models.
    b. Emphasized that question development should provide feedback to faculty for course improvement.

‘Graduation’ Exam Format

5. Each course allocated the same number of questions:
   a. MET – 10 questions per subject area.
   b. CIMT – 8 questions per subject area.
6. Final exam contains 120 multiple choice questions. Exam administered allowing 2 minutes per question.
7. Exam is administered in open book and bound note format.

MET Exam Format

1	CGT 110 MET 102/328	Engineering Graphics
2	IET 350	Engineering Economics
3	MET 105	Engineering Calculations
4	MET 111	Engineering Statics
5	MET 141/344	Materials
6	MET 142/242	Manufacturing Processes
7	MET 211	Strength of Materials
8	MET 213	Dynamics
9	MET 214	Machine Elements
10	MET 220/320	Heat and Thermodynamics
11	MET 230	Fluid Power
12	MET 350	Fluid Dynamics

CIMT Exam Format

1	CGT 110 MET 102/328	Engineering Graphics
2	CIMT 224	Production Planning
3	CIMT 260	Robotics
4	CIMT 310	Facilities Layout
5	IET 150	Industrial Statistics
6	IET 300	Dimensional Metrology
7	IET 350	Engineering Economics
8	IET 454	Statistical Quality Control
9	MET 105	Engineering Calculations
10	MET 141	Materials
11	MET 142/242	Manufacturing Processes
12	MET 212	Engineering Mechanics
13	MET 230	Fluid Power
14	MET 240	Foundry Science
15	MET 271	Computer Controlled Machining

Examinations

Results

Conclusions

1. The Department of Mechanical Engineering Technology has achieved a modest level of experience in developing student learning outcomes assessment programs for engineering technology programs.
2. The ‘Graduation’ examination has shown great potential and has garnered the department a high level of attention by similar programs at other schools.