Counting Down to 2004: Some Insights and Strategies for Satisfying TC2K While There is Still Time

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Abstract

Next fall (2003) will be the last time a technology program may choose to be evaluated under the old criteria of the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). Starting in 2004 accreditation visits will be governed by the "Technology Criteria 2000" (TC2K) criteria except for interim visits. What does this mean operationally for programs? It means that faculty and administrators must be prepared to prove that their students at the end of the program satisfy the required a through k outcomes of Criterion 1. Program criteria developed by professional societies must be satisfied and continuous improvement processes based on assessment data evaluation must be in place and producing results. Additionally, program objectives that satisfy constituents and are consistent with the institution's mission, goals, and objectives need to be defined and data gathered on graduates to show the quality of the program in meeting these objectives.

The authors are drawing on their TC2K program evaluator experience and on their TC2K evaluator training to prepare their programs at Purdue Calumet for a visit under the new criteria in fall, 2005. This paper will point out sources of information on how to prepare for an accreditation visit and will discuss preparations at Purdue University Calumet to meet the TC2K criteria. Thus far, a continuous improvement culture has been cultivated with several measures that will be mentioned in the paper. Ten new tools for assessment have been developed that fit within a continuous improvement paradigm and meet strategic planning needs at the school, department, and program levels. Course embedded assessment measures to collect student outcomes data are being implemented. And finally, curriculum adjustments to accommodate new TC2K requirements are considered.

I. Background

The change from accreditation based on program topics to outcomes based assessment is probably the biggest driver for change in technology education since the beginning of technology programs. Prior to TC2K, TAC/ABET specified a list of topics that must be covered in a program's curriculum and other requirements for accreditation. The process was often called "bean counting." Preparations for accreditation included collecting sample course work from students to prove that each topic was adequately covered. Preparations were done the year prior to the accreditation visit. Other than advisory committee meeting minutes, little else followed year-to-year, so the accreditation visit only viewed a small snapshot of the program. In

retrospect, of course, this accreditation method created a number of problems. First, program quality was only an immediate concern in the year prior to an accreditation visit, tending to slow improvements down to the accreditation cycle, usually every six years. Second, the accreditation method discouraged integrating program topics[1]. And third, this method paid no attention to what the students needed or what the employers or any other constituents wanted in technology graduates.

While academia changes slowly, it does change. Shortcomings in the previous accreditation methods became apparent, and this, coupled with an industry interest in continuous improvement, precipitated changes in engineering and technology accreditation to the current outcomes based assessment. The now familiar TAC/ABET a-k criteria[2] will not be repeated here, but they, as part of the new accreditation method require a paradigm shift – a complete change in how educators view the presentation and management of a curriculum. Finding and teaching material to satisfy externally imposed student outcomes requires substantial adjustment for most educators. Even more difficult to cope with is the requirement to demonstrate (prove) to a TAC/ABET program evaluator that students have developed the required abilities and expertise by the end of their program. The instructor must obtain, evaluate, and present meaningful student assessment data rather than providing sample graded tests and other exhibits for the TAC/ABET visitor to evaluate. Improvements resulting from a continuous improvement process must be presented as well. The remainder of this paper presents Purdue University Calumet's (PUC's) adaptation to this paradigm shift.

II. A Common Language

An early hurdle in PUC's efforts to move towards outcomes assessment was a language barrier. Efforts to define Goal, Objective, Outcome, etc. met with heated debates that often took hours with little to show for the effort. Fortunately, TAC/ABET came out with a set of definitions that simplify the language problem considerably[3]. ABET specifies that any terminology desired by an institution may be used as long as the terms are defined. However, the language in the TC2K criteria is essentially fixed, so programs using compatible terminology will have an advantage in communicating with program evaluators. The TAC/ABET definitions provided at Technological Education Initiative Regional Faculty Workshops and TC2K program evaluator training are as follows:

A Goal is a specific result that is to be achieved by the educational activities. According to TC2K Criterion 6:

- Written Goals are required.
- Goals must focus on developing the a-k student outcomes.
- Achievement of Goals must be demonstrated through a variety of methods.

And according to Criterion 5:

- The industrial advisory committee representing employers must advise in establishing, achieving, and assessing goals.

An Objective also called a Program Educational Objective is a statement that describes an expected accomplishment of graduates the first few years after graduation. There are two types

of objectives – those that all graduates are expected to accomplish and those that some, but not all graduates are expected to accomplish. According to TC2K Criterion 6:

- Objectives must address the needs of employers, students, and the institution.

According to Criterion 2:

- Technical specialization must manifest itself through program objectives, etc.

The authors of this paper would like to point out that the TC2K criteria terms[4] *Program Goal* and *Program Educational Objective* are synonymous, with the term *Program Educational Objective* preferred. The terms *Vision and Mission* are preferred instead of the term *Overall Institutional Goals* used in previous accreditation criteria, to describe lofty aims which are not measurable as stated but which guide in the preparation of written *Program Educational Objectives* and *Outcomes*.

"*Program Educational Objectives* are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve during the first few years following graduation," according to the proposed TAC general criteria[2] to be effective for 2004.

Metrics are specific measures used to prove objectives are being met.

"*Program Outcomes* are statements that describe what units of knowledge or skill students are expected to acquire from the program to prepare them to achieve the program educational objectives. These are typically demonstrated by the student and measured by the program at the time of graduation," according to the proposed TAC general criteria[2] to be effective for 2004.

Assessment consists of one or more processes that identify, collect, use and prepare data that can be used to evaluate achievement of program outcomes, educational objectives or program effectiveness.

Evaluation consists of one or more processes for interpretation of the data and evidence accumulated through assessment practices that a) determine the extent to which program outcomes or educational objectives are being achieved; or b) result in decisions and actions taken to improve the program (e.g. curriculum or methodology).

In TC2K it is important to evaluate all relevant assessment data and provide the results of the evaluation to the visiting team. The philosophy behind the new criteria is that:

- Institutions and Programs define mission and objectives to meet the needs of their constituents and enable program differentiation.
- The emphasis is on outcomes, which is tantamount to preparation for professional practice.
- Programs demonstrate how criteria and educational objectives are being met.

III. A Continuous Improvement/Assessment Culture

Assessment and continuous improvement are inseparable links in the same chain. The reason for assessment is to improve; hence, the tie between the two. Therefore, as part of preparations for TC2K accreditation, it is very important to cultivate a continuous improvement culture amongst

all program faculty. The authors' department at Purdue University Calumet has institutionalized[5]:

- Annual reports used for determining yearly raises. These are done in a continuous improvement format including an individual mission statement followed by general goals/objectives in support, then tactics and strategy. The activities, accomplishments, honors, publications, course improvements, and other evidence in support are listed under the appropriate goal, objective, tactic, or strategy.
- Tenure and promotion documents of department faculty use the same continuous improvement format as annual reports.
- Curriculum update forms are turned in at the end of the semester for each course to track course improvements such as a - k assessment initiatives. The curriculum update forms are attached to an individual's annual report. If a course update form is missing, it is assumed the instructor "coasted" in that course that semester.

Much has been written about continuous improvement, but it is perhaps described most simplistically as the Deming Cycle[6] shown in Figure 1. The steps in this cycle may be summarized as follows:

Plan – Determine what needs to be improved and develop an implementation plan to accomplish this goal
Do – implement the plan
Study- assess the results of the implementation
Act – make appropriate adjustments to the original plan if needed or institutionalize the changes if the assessment shows that the new process is accomplishing the original plan goal
Close the loop by repeating the process.

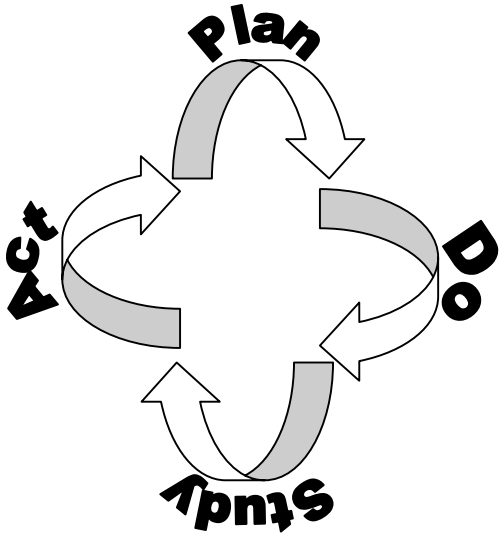

Figure 1 – Plan, Do, Study, Act Process for Continuous Improvement

"Closing the loop" is a concept that has limited value if regarded as "Starting the process over again." If regarded as institutionalizing the process of finding program

improvement initiatives however, the concept augments assessment data to make the program improvement process more continuous.

Further discussion about the continuous improvement/assessment process will follow in the appropriate sections below.

IV. Strategic Planning

TC2K Accreditation can be thought of as a large project, and, as with all large projects, considerable up-front work should precede action. This is the Plan portion of Figure 1. Most industry and academic experts agree that a strategic plan should encompass approximately a five-year period, so it fits well with the program objectives mentioned earlier. At PUC, strategic Planning for the Manufacturing Engineering Technologies and Supervision Department (METS) followed a series of 5 steps:

Step 1. Reflect on where your program came from.

For PUC, the most noticeable observation comes from the changing demographics of the service area. In 1979, 46% of area residents found employment in the goods sector, primarily manufacturing, while in 1999, only 24%. This has a significant effect on the programs offered by the METS department: Mechanical Engineering Technology (MET), Industrial Engineering Technology (IET), Organizational Leadership and Supervision (OLS) and Computer Graphics Technology (CGT).

Step 2. Determine who are your constituents.

METS faculty decided that their constituents in priority order include students, employers, and faculty. Since most of the students are non-traditional, parents were not included in this list.

Step 3. Decide where you want your program to go.

This resulted in development of mission and vision statements for each program within the department. An example of these for the Mechanical Engineering Technology program is as follows:

Mechanical Engineering Technology Program Vision:

- To be the preferred choice of regional students interested in learning mechanical engineering technology topics at the individual course, certificate, associate, and bachelor level.

Mechanical Engineering Technology Program Mission:

The Mechanical Engineering Technology program mission is three-fold:

1. The program will provide a student-centered learning environment where students with mechanical interests and aptitudes learn the mathematical skills, scientific principals, and mechanical engineering technology topics needed to earn associate and bachelor degrees in preparation for a wide variety of careers in related fields.
2. The program will provide training at the individual topic, individual course, and certificate level for individuals interested in learning mechanical engineering technology topics regardless of a traditional degree goal.

3. The program will provide technical assistance in mechanical engineering technology related areas to local businesses.

Step 4. Determine your objectives, metrics, and assessment techniques.

The MET AS and BS degrees have three program objectives.

The Mechanical Engineering Technology program will produce graduates that:

1. Are prepared for successful careers in the areas associated with the design, installation, manufacturing, testing, evaluation, technical sales, or maintenance of mechanical systems.
2. Advance in their careers and continue their professional development.
3. Understand the overall human context in which engineering technology activities take place.

An example of metrics and assessment techniques for Objective 1 is given in Table 1:

Table 1 Metrics for MET Program Objective 1

Objective 1 Metrics	**Assessment Methods**
Graduate first year job placement results will be high. (Numeric goals will be determined after the baseline year)	Placement Statistics
Graduates will agree that their education prepared them for an entry-level job. (Numeric goals will be determined after the baseline year)	Alumni Survey
Employers will agree that MET program graduates are prepared for an entry-level job. (Numeric goals will be determined after the baseline year)	Employer Survey

Step 5. Determine specific student outcomes and assessment techniques for each objective.

An example for Objective 3 above is given in Table 2:

Table 2 Related Outcomes & Assessment Methods for MET Outcome 3

Objective 3 Related Outcomes	**TAC Criterion 1: Students and Graduates (a-k)**	**Assessment Methods**
Students will have exposure to situations that develop a sense of personal responsibility and accountability for one's individual actions and performance.	i, k	1. Course Embedded 2. Alumni and Employer Surveys 3. Exit Survey
Students will have exposure to situations that develop their philosophy and appreciation for human differences.	i, j	1. Course Embedded 2. Alumni and Employer Surveys 3. Exit Survey
Students will be able to demonstrate the ability to communicate in individual and team settings.	e, g	1. Course Embedded 2. Alumni and Employer Surveys 3. Senior Projects 4. Exit Survey

V. Program Assessment

Once the strategic plan is in place, program assessment techniques must be determined. These techniques must be developed not only at a program level but also at the department and course levels in order to be truly effective. The techniques must be documented to include what to measure, how often to measure, and who should perform the measurement. For the METS department at PUC, ten assessment tools were developed for this purpose. These tools have become the basis for an annual departmental assessment report required by the University. The assessment report is tied directly to the University Strategic Plan. The ten tools were structured to include all assessments required by the University as well as the various accreditation agencies of which the main one for the METS department is ABET. Designing the tools with this aim has allowed the METS department faculty to minimize paperwork and focus on actual continuous improvement efforts rather than simply writing multiple reports to satisfy various constituents who are essentially looking for the same information.

The ten assessment tools developed by the METS faculty focus on assessing the following five general areas:

1) faculty,
2) student enrollment and professional activities,
3) facilities and equipment,
4) curriculum, and
5) teaching and learning.

Throughout each academic year, different faculty are assigned the task of collecting and summarizing the data for the various tools. A department assessment committee consisting of four faculty (two of whom are rotated off of the committee every other year), then arrange a draft of the final assessment report and provide feedback to the rest of the department during an annual department retreat. With this approach to department assessment, all faculty have input to and involvement in the overall process. The METS department assessment tools are shown in Table 3:

Table 3 METS Department Assessment Tools

Tool	Assessment Data for
T1 - Summary of annual faculty data	Faculty
T2 - Enrollment Summary	Enrollment & Professional Activities
T3 - Equip./Tool/Mach./Space/Tech. Survey	Facilities
T4 - Summary of Dept. Curriculum Documents	Curriculum
T5 - Individual Course assessments	Teaching and Learning
T6 - Employer/Alumni Surveys	Teaching and Learning
T7 - Graduate Exit Surveys	Teaching and Learning
T8 - a through k matrix (Program outcomes assessment)	Teaching and Learning
T9 – Nationally normed exams	Teaching and Learning
T10- Advisory Board Input Summary	Appropriate Areas

An example of a "Tool" can be seen below in Figure 2. Upon review of this "Tool" it becomes obvious that the "Tool" is nothing more than the prescription of what assessment data needs to

be looked at and evaluated in order to verify the department and program goals are being met. The key is in using a tool on an on-going basis and doing it so that all faculty are involved. With the knowledge of what to collect, who is responsible, and when, the data prescribed is collected into a central system through out the year and summarized as needed for use. Data is not collected for the sake of data collection, but rather only if a purpose is documented in terms of needing it to support attainment of a specified goal/objective/outcome. Prior to the development of these tools it was common practice for the department head (or a designee) to collect whatever data was available at the time the report was due and put together a report that no one else within the department would ever see or use.

Enrollment Summary

I. Data

What data is needed

1) # of students enrolled in a program per semester
2) # of credit hours taken by those same students
3) # of students with full-time status (over 12 credit hours)
4) # of courses offered per program (also # combined with other departments if any)
5) # of courses required to be canceled and reason for cancellation
6) # of graduating seniors (or A.S. and certificates graduates if this is the terminal degree for the student)
7) # of students pursuing certificates only
8) # of students in professional societies and a-k related chapter activities.

Where data comes from

1) Banner report based on major codes give # of students officially enrolled per semester for items 1-3 and 6 above
2) Banner report of course lists for a semester will state item 4 above
3) Program coordinators conducting graduation audits have the data on item 5 above
4) Professional organization student chapter annual reports.

When data should be gathered and by whom

1) Items 1-3 and 6 above may be gathered as early as the end of late registration but should be collected and reported for maximum benefit before the next semester schedule is developed. This should be done by the program coordinator scheduling courses and should be reviewed as input to the next schedule.
2) Current METS program coordinators.
3) Professional organization student chapter advisors.

Purpose for collecting this data

Development of semester schedules
Development of 3-year plan
TC2K Self-Study Questionnaire

Correlation to program and department goals

Department goals 5 and 6 are supported
MET and IET educational objectives 2 and 3.

II. Evaluation and Assessment of Data

An analysis of the raw data collected in section I will be completed and tabulated as appropriate tables, graphs, or charts. In addition, a short summary describing any significant trends or implications will be written. It is expected that the IET, OLS, MET and CGT programs will each track this data separately but in similar format so that it may also be compiled and summarized at a department level.

III. Outcomes / changes / improvements

When determining the data to be collected, the purpose for collecting it is to be identified. A short summary is to be written describing the outcome results, and especially improvements, from collecting and assessing this data.

Figure 2 Example of Assessment Tool 2

Course Embedded Assessment

Course embedded assessment[7] takes two basic forms: student assessment of the course and faculty assessment of how well students met the course objectives. Student assessment of courses is done with an extensive on-line student assessment tool called the Student Assessment Tool. This tool is broken down into four parts: Student Self-assessment, General Course Impact (ABET concerns), Course Management, and Course Objectives. Shown in Figure 3, this tool has been designed with the first three sections common, and with the course objective portion easily modified for different courses. The appropriate Likert scale for each question has been removed in the interest of space. The students perform the assessment during regular course hours with a proctor in the room instead of the instructor. Blackboard is the delivery tool, and it tells the instructor when a student has taken the survey, but all responses remain confidential. Blackboard also summarizes the data and presents useful statistics. Although much modified, it is based on the work of Land and Hager[8].

Specific Student Responsibility Questions:

1. I attended scheduled classes and labs.
2. I arrived on time for scheduled classes and labs.
3. I read the course material/text when it was assigned.
4. I was well prepared for class.
5. I participated in classroom discussions and activities.
6. I used the supplemental materials or website (Bb) my instructor provided.
7. My ability to apply knowledge from pre-requisite courses for this course can be rated as,

General Course Impact Questions:

8. As a result of this course, my mastery of the knowledge, techniques, skills, and modern tools of the Mechanical Engineering Technology discipline can be described as,
9. As a result of this course, my ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology can be rated as,
10. As a result of this course my ability to conduct, analyze, and interpret experiments and apply results to improve processes can be rated as,
11. As a result of this course, my ability to apply creativity in the design of systems, components, or processes appropriate to program objectives can be rated as,
12. As a result of this course, my ability to function effectively on teams can be rated as,
13. As a result of this course, my ability to identify, analyze, and solve technical problems can be rated as,
14. As a result of this course, my ability to communicate effectively can be rated as,
15. As a result of this course, my recognition of the need for, and an ability to engage in lifelong learning can be rated as,
16. As a result of this course, my ability to understand professional, ethical, and social responsibilities can be rated as,
17. As a result of this course, my respect for diversity and knowledge of contemporary professional, societal, and global issues can be rated as,
18. As a result of this course, my commitment to quality, timeliness and continuous improvement can be rated as,

Specific Course Management Questions:

19. My instructor passed out a syllabus or made one available in the Internet early in the course.
20. I was able to understand the syllabus and grading procedures.
21. The instructor followed the syllabus.
22. Given the ease or difficulty of the material presented in this course, the exams represented the topics covered fairly.
23. The course assignments were related to the material being covered.
24. The laboratory assignments in this course help reinforce the topics being covered and make them easier to learn. (Only for classes with labs.)
25. My instructor returned graded material such as homework and tests in a timely manner.

26. My instructor was on time and prepared for class.
Specific Course Objective Questions: 27. A specific objective of this course is to explain the use and applications of parametric design. How well did this course meet this objective? 28. A specific objective of this course is to explain the use and applications of finite element analysis (FEA). How well did this course meet this objective? 29. A specific objective of this course is to explain the use and applications of computer aided manufacturing (CAM) systems. How well did this course meet this objective? 30. A specific objective of this course is to explain the integration of all aspects of a product's life cycle. How well did this course meet this objective? 31. A specific objective of this course is to use parametric design, FEA, and CAM systems to design, analyze, and manufacture mechanical components. How well did this course meet this objective?

Figure 3 Student Assessment Tool

The final course assessment tool relates student grades against the course objectives as shown in Table 4. Much research on course assessment tools of this type is available[9], and this is among the simpler types. The authors intentionally created a simple form because these forms must be generated for 23 courses at the same time, and the faculty felt a short, simple form would be the best place to start. After results have been analyzed from a year or two's data, the forms will be revisited, all as part of the continuous improvement plan.

Table 4. Course Assessment Tool

MET461 Computer Integrated Design & Manufacturing Course Assessment Tool Semester: Instructor:						
ABET Criterion 1 Outcomes Satisfied: a,b,c,d,e,f,h			**MET Program Strategic Plan Supported Objective(s): 1, 2, 4**			
Course Objective	**Assessment Tool 1**	**Score**	**Assessment Tool 2**	**Score**	**Assessment Tool 3**	**Score**
Explain the use and applications of parametric design.	Final Exam					
Explain the use and applications of finite element analysis (FEA).	Lab Assignments		Final Exam			
Explain the use and applications of computer aided manufacturing (CAM) systems.	Lab Assignments		Team Project			
Explain the integration of all aspects of a product's life cycle.	Team Project		Final Exam			
Use parametric design, FEA, and CAM systems to design, analyze, and manufacture mechanical components.	Lab Assignments		Midterm and Final Exams		Team Project	

VI. Curriculum Adjustments

The a-k outcomes required by the TC2K accreditation criteria are new to technology programs. PUC's technology programs will certainly satisfy the more technical outcomes a, b, c, d, and f

and the related program criteria with tweaking currently required courses. There should also be little trouble satisfying the teamwork and communication outcomes e and g respectively. The challenge for most programs will be meeting the last four required outcomes initially. These outcomes include:

h. a recognition of the need for, and an ability to engage in lifelong learning,
i. an ability to understand professional, ethical, and social responsibilities,
j. respect for diversity and a knowledge of contemporary professional, societal, and global issues, and
k. a commitment to quality, timeliness and continuous improvement.

The majority of PUC graduates take jobs in the manufacturing sector, so the PUC faculty has considerable expertise in quality and continuous improvement. Outcome k should be able to be met within current courses. How can the remaining three outcomes i, j and k which encompass lifelong learning, diversity, professional, societal, and social issues and responsibilities be met? Two possibilities are suggested:

- Change the curriculum to require one or more courses that deal with these topics. In this regard the program could look closely at how engineering colleagues are meeting similar needs due to their EC2000 outcomes i, f, h, and j. Perhaps writing specifications for a humanities or social studies course or two with the help of engineering faculty or requiring a zero or one credit hour seminar taught by engineering and/or technology faculty would help.
- Some free Internet modules are being developed by professional societies such as ASME to help with these areas. Such modules might be used in-class or outside in workshops or student chapter society meetings.

VII. Portfolios

ASME did a study[10] supported by the NSF, of programs (44) that underwent an EC2000 visit prior to or during fall, 1999. Forty eight percent of the total participated & reported their experiences. These schools included: Arkansas, Alfred Univ., Clemson, Colorado, Denver, Georgia Tech, Johns Hopkins, Houston, Idaho State, Kentucky, U of Michigan, Mississippi State, North Dakota, Northwestern, Ohio State, Pittsburgh, San Jose State, U of South Alabama, South Carolina, Tennessee, and Worcester Poly.

ASME found regarding student portfolios, "Implementing this type of tool resulted in the accumulation of massive amounts of data whose usefulness was questionable. All of the mechanical engineering programs participating in the project that initially considered using this approach subsequently abandoned it." Rogers and Williams[11] suggest “proceeding with caution” for programs considering using portfolios.

As for TC2K, the 2002 TAC Summit slide show[2] says on one slide "team chairs and program evaluators were spending more than twice the time as before"and "time management on-site used to be difficult; now it's impossible." The METS department at Purdue University Calumet has decided to avoid portfolios, which are prone to the drawbacks of the exhibits that were collected under the old criteria, coupled with program evaluators’ inability to evaluate them because of the philosophy and demands of TC2K. We will however continue collecting significant and impactful student projects/assignments; evaluating them individually (often with rubrics) and

summatively. These will be shown to the evaluator to support the competence of our students with the summative evaluation results supporting applicable a through k outcomes.

Conclusion

In preparation for a TAC/ABET accreditation visit in 2005, the authors have identified student outcomes and program educational objectives as crucial elements to be defined for each program, to be assessed and evaluated, with evaluation results prepared for presentation to a TAC/ABET visiting evaluation team. The term "program goals" is synonymous with "program educational objectives" in the TC2K criteria. The TC2K criteria for 2004 will be adding the requirement that "Each program must utilize multiple assessment measures in a process that provides documented results to demonstrate that the program objectives and outcomes are being met. Assessment measures typically consist of, but are not limited to, student portfolios, student performance in project work and activity-based learning; results of integrated curricular experiences; relevant nationally-normed examinations; results of surveys to assess graduate and employer satisfaction with employment, career development, career mobility, and job title; and preparation for continuing education." The term A*ssessment Measure* here appears to be related or synonymous with *Assessment Method* as defined by Rogers[12] and shown in Appendix 1.

The METS department at Purdue University Calumet is starting with a minimal set of program educational objectives and the required a-k student outcomes. While it is easy to criticize reliance on the TAC outcomes as "taking the easy way out," the PUC faculty thinks it imprudent to add additional complications as we learn how to cope with TC2K's required outcomes the first time. Assessment data from student course objectives and course exit surveys are being collected and will be evaluated as part of the strategic planning process. The department has developed a continuous improvement culture with everyone helping (and being required to help) prepare the evaluation evidence. In time, it is expected that additional program educational objectives and student outcomes will be developed, current objectives and outcomes changed as part of the continuous improvement process. Besides assessment evaluation data as an input to the continuous improvement process, suggestions/ brainstorming from the advisory committees, students, faculty, staff, and the literature are sought after to generate additional program improvement initiatives.

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Biography

GREGORY P. NEFF, P.E. has served as an MET TAC/ABET program evaluator since 1996. He currently serves on the American Society of Mechanical Engineers (ASME) Committee on Technology Accreditation in charge of training new MET evaluators and will be starting a five-year term as an ASME commissioner on the Technology Accreditation Commission in summer, 2003. He was a program evaluator on a TC2K accreditation visit in 2002.

SUSAN SCACHITTI teaches total quality management, consults in the area of continuous improvement, and chairs her department's assessment committee. She is program chair of the IE Division of ASEE and formerly served as newsletter editor and treasurer. She is an IET TAC/ABET program accreditation evaluator and will be starting a five-year term as an IIE commissioner on the Technology Accreditation Commission in summer, 2003.

JAMES B. HIGLEY, P.E. holds the rank of Professor of Mechanical Engineering Technology at Purdue University Calumet. He is responsible for coordinating the Mechanical Engineering Technology (MET) program, as well as teaching courses in parametric modeling; integrated design, analysis & manufacturing; manufacturing processes; and thermodynamics. He holds Bachelor and Masters Degrees in Mechanical Engineering from Purdue University.

Appendix 1

Assessment Methods

1. **Written surveys and questionnaires** (Asking individuals to share their perceptions about the study target-e.g., their own or others' skills/attitudes/behavior, or program/course qualities and attributes).

2. **Exit and other interviews** (asking individuals to share their perceptions about the target of study-e.g., their own skills/attitudes, skills and attitudes of others, or program qualities-in a face-to-face dialog with an interviewer).

3. **Commercial, norm-referenced, standardized examinations** (commercially developed examinations, generally group administered, mostly multiple choice, "objective" tests, usually purchased from a private vendor.

4. **Locally developed examinations** (objective or subjective designed by local staff/faculty).

5. **Archival Records** (biographical, academic, or other file data available from college or other agencies and institutions).

6. **Focus groups** (guided discussion of a group of people who share certain characteristics related to the research or evaluation question, conducted by trained moderator).

7. **Portfolios** (collections of work samples, usually compiled over time and rated using rubrics).

8. **Simulations** (a ***competency based*** measure where a person's abilities are measured in a situation that approximates a "real world" setting. Simulation is primarily used when it is impractical to observe a person performing a task in a real world situation (e.g., on the job).

9. **Performance Appraisals** (systematic measurement of overt demonstration of acquired skills, generally through direct observation in a "real world" situation-e.g., while student is working on internship or on project for client).

10. **External Examiner** (using an expert in the field from outside your program - usually from a similar program at another institution - to conduct, evaluate, or supplement the assessment of your students).

11. **Oral examinations** (evaluation of student knowledge levels through a face-to-face dialogue between the student and the examiner-usually faculty).

12. **Behavioral Observations** (measuring the frequency, duration and context of subject's actions, usually in a natural setting with non-interactive methods).

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