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Comprehensive Program Assessment: The Whys and Wherefores

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Introduction

Many faculty view program evaluation as a strenuous process, something imposed by a higher authority, another hoop to jump through, and of little real benefit. In fact, there are a number of reasons to undertake some level of program evaluation. First, evaluation is required by entities external but, nonetheless, important to the academic institution, including accrediting agencies. Most academic institutions also have internal plans and evaluation requirements directed at assuring quality of programs and services. Evaluation data can make a case with decision makers for increased support for under-resourced areas.

While evaluation is then imposed on faculty by various authorities, it is also a matter of professional integrity. Faculty members want to deliver good programs that enable their students to gain secure, stimulating and satisfactorily remunerative employment, as well as ensure employers of the competence and potential of program graduates. Evaluating programs allows faculty to reflect, to better understand how a program is working, and where it is headed. It enables faculty to catch potential problems related to curriculum early and make corrections before more serious problems occur. Evaluation driven by faculty integrity spawns continual program improvement, which helps to establish best practices that can be passed on to others.

Thus, while evaluation can be viewed as onerous, most faculty members are engaged in some form of program evaluation. Often evaluation efforts are disconnected and small and specific in focus. What is needed is a system for collecting, compiling, and warehousing data in a planned, consistent and methodical way. Once data gathering and warehousing are systematized, analysis and review can take place, after which action can be based on the information.

During the 2002-2003 academic year, the Assessment and Continuous Improvement Committee (ACI) of the College of Technology at the University of Houston was formed representing faculty in diverse program areas. The committee was tasked with planning and implementing a broad program assessment and continuous improvement process for the College. The ACI Committee defined the overall committee goal as follows: “Develop a process for acquiring information that will help programs excel, endure and become stronger.”

The paper describes processes employed in developing the assessment system. The system to date consists of a set of assessment goals, multiple indicators for each goal, ways to measure attainment of an indicator, and a phased implementation plan. In this paper, particular emphasis

is given to the goals identified for the assessment system, the associated indicators and ways of measuring attainment of an indicator. Merits and problems associated with measures are described, and some results to date are presented.

Resources

Excellent taxonomies, standards, and guidelines exist for use by educators in program evaluation and assessment of student achievement. [1,2,3,4,5,6] Application of principles espoused by taxonomies and standards yields the potential for higher quality data for analysis and application; thus, it is critical to be knowledgeable of these when undertaking a program evaluation project. Knowledge of standards and guidelines does not automatically create an assessment system. Critical elements remain to be developed including specific goals for the assessment system, specific and reliable and valid ways to measure indicators of those goals, and a manageable process for the execution of the evaluation.

The project described herein was grounded upon substantial contributions in the fields of assessment and evaluation and the development of system elements based on feedback. The editorial work of Bransford, Brown, and Cocking in *How People Learn: Brain, Mind, Experience, and School*[7], for example, added much as reflected in the statement, "The objective of the analysis was to ascertain what is required for learners to reach deep understanding, to determine what leads to effective teaching, and to evaluate the conditions that lead to supportive environments for teaching and learning". Specifically, important for this project was their resource on concepts such as learning with understanding, conceptual reorganization, organization of knowledge, transfer and application of knowledge to new situations, and problem solving. Anderson and Krathwohl's contributions in the recreation of Bloom's taxonomy provided dimensions for emphasis in factual, conceptual, procedure, and meta-cognitive knowledge areas matched against the cognitive process dimensions of remembering, understanding, applying, analyzing, evaluating, and creating. [1]

Among the foundational works which focused specifically on evaluation and assessment, the contributions of Sanders [6] as chair of the Joint Committee on Standards for Educational Evaluation, and Fox and Hackerman [5] for the Committee on Recognizing, Evaluating, Rewarding, and Developing Excellence in Teaching of Undergraduate Science, Mathematics, Engineering, and Technology of the National Research Council were especially important. Both provided valuable general and specific recommendations for evaluation and assessment. Sanders' work also provided a set of usable standards including utility, feasibility, propriety, and accuracy dimensions. Available guides that helped direct this project include "Best Practices in Assessment: Top 10 Task Force Recommendations" [3], "AAHE's 9 Principles of Good Practice for Assessing Student Learning" [2], *User-Friendly Handbook for Project Evaluation: Science, Mathematics, Engineering and Technology Education* [8], and *User-Friendly Handbook for Mixed Method Evaluations* [9].

Process

Recognizing that program evaluation can be a sensitive subject for faculty and administrators, the ACI committee began by establishing several guiding principles. One of the guiding principles pertains to the system development process, and three pertain to the system to be

developed. First, the committee recognized that if an assessment system is to be accepted and embraced by the faculty, stakeholder involvement in the system development process is essential. The committee agreed that faculty input would be sought and considered at every step of the development process. The committee visualized the process as evolving over time in sequences of two-step cycles, each cycle consisting of a divergence step followed by a convergence step (see Figure 1). The first step, divergence, refers to the committee reaching out to the faculty with information, suggestions, and a request for input about some aspect of the assessment system under development. The second step, convergence, refers to the committee compiling, filtering, reflecting on, and synthesizing the input from the faculty together with information taken from the assessment and evaluation literature. The committee agreed that this guiding principle would be in place throughout the system development process.

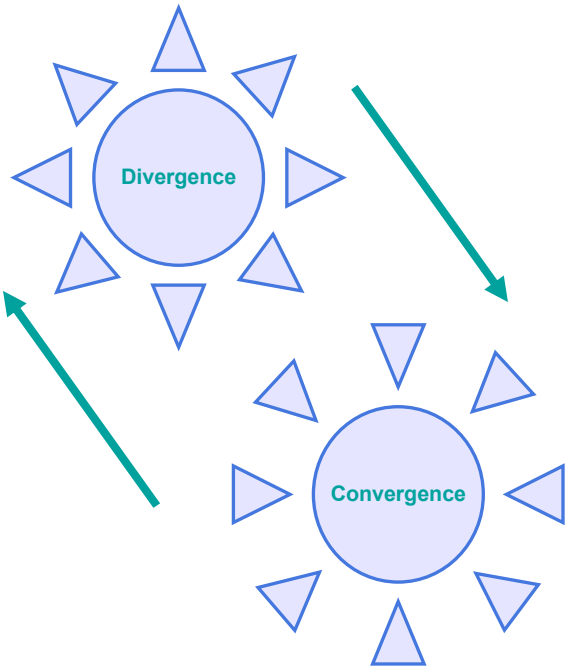

Figure 1 Divergence Convergence Cycle

With respect to the assessment system to be developed, the committee agreed to three overriding guiding principles. First, simplicity of implementation is **essential.** Whatever the system components turned out to be, it would have to be very easy for faculty to comply with the request for data. In a similar vein, it was felt mandatory that the utility of the compiled information be considered. If the data collected were not going to be used, then there was no purpose in collecting that data. Third, the committee agreed that the system developed must consider and complement accreditation requirements. That is, the result could not yield two parallel and uncomplementary data collection and compilation systems.

The committee then established an overall mission statement for the evaluation process. That statement reads, “Develop a process for acquiring and disseminating information that will help programs excel, endure and become stronger.” This mission statement reflects the positive tone that the committee felt was extremely desirable for the evaluation process. After these guiding principles were stated and recorded on paper, they were sent to the faculty for input in the spirit of divergence/convergence.

The next step in the cyclical process of convergence/divergence was to define areas to be measured. Faculty members were involved at the beginning of this process in brainstorming sessions and in follow-up discussions. An initial list of areas was generated, which then went through a refinement process. The initial list developed was considered a rough draft and it was refined and polished by the committee. The next stated goal was to reduce the refined list and thus define the scope of the evaluation system by conducting a peer review of refined list. This refined list was presented to faculty through department level meetings. The list of areas to be measured emerged as the following ten areas.

- Curriculum
- Instruction
- Facilities
- Program Identity
- Graduate Placement
- Financial Resources
- Student Services
- Alumni Relationships
- Industry Relationships
- Administrative Support

The next step was to translate the areas to be measured into goal statements. During this convergence step as the list of ten areas was discussed, several areas were merged together, which resulted in the following eight goal statements.

- Ensure an appropriate and strong curriculum with effective instruction.
- Ensure appropriate physical facilities.
- Ensure appropriate program identity.
- Ensure appropriate graduate placement.
- Ensure effective student services
- Ensure strong alumni and industry relationships.
- Ensure effective administrative program support.
- Ensure a strong faculty base.

Once goal statements were cycled through the faculty for feedback and input, the committee set out to develop statements that imply attainment of a goal. These statements ACI called indicators. The committee agreed that an indicator is a statement that: implies a measurement method, is likely to insure that the needed information is obtained, is specific, is applicable to only one goal, is understood by those who provide the information, is minimally disruptive to faculty, students and staff, and describes an affordable and manageable process. Indicators were sought for which there were already data collection processes in place. The committee wished to avoid reinventing processes that already existed.

Specifically, indicators are statements from which accomplishment of a goal can be inferred. In order for these statements to be useful in the development of the system of assessment, it was required that indicators meet the following criteria:

- An indicator must be measurable.

- Where possible, indicators should reflect information already gathered by the departments, college or the university.
- Indicators will apply to only one goal, but a measurement tool that provides data for an indicator might provide data for more than one indicator. For example, a survey might gather information measures for several indicators.
- Where possible data gathered in support of indicators should also support the need for data for accreditation of programs.

Some Results

The result of this step of the process was a matrix of goals and indicators. To facilitate discussion and use, the goals were numbered and the indicators were numbered for each goal. For example the second indicator for goal five was numbered 5.2. A table of goals and indicators is included as Table 1.

Table 1 Goals and Associated Indicators

Goal 1 - Curriculum and Instruction Ensure an appropriate and strong curriculum with effective instruction.	
1.1	Program competencies are developed and approved by program faculty.
1.2	Students understand important concepts in their discipline as reflected in program competencies.
1.3	Faculty develop and grow appropriate course offerings. Were courses modified or new courses added?
1.4	Students have a positive reaction to classroom instruction and program offerings.
1.5	Students are retained.
1.6	An appropriate number of the course offerings are taught by full-time faculty.
1.7	Class sizes at an appropriate level.
1.8	Innovative instructional approaches incorporated into the classroom, as appropriate.
Goal 2 – Physical Facilities Ensure appropriate physical facilities.	
2.1	The academic department provides students with adequate information regarding department equipment and facilities.
2.2	Students are satisfied with general purpose classrooms, computer laboratory facilities, and support.
2.3	Faculty members are satisfied with general purpose classrooms, computer laboratory facilities, and support.
2.4	Equipment and technology in support of research is adequate to meet the needs of students and faculty.
2.5	Academic departments have a plan to acquire, replace, and maintain equipment and facilities.
Goal 3 – Graduate Placement. Ensure appropriate graduate placement.	

3.1	Graduates secure appropriate employment.
3.2	Graduates secure an appropriate salary upon graduation.
Goal 4 – Student Services and Outreach Ensure effective student services and outreach.	
4.1	Students are satisfied with Academic Services Center (ASC) service.
4.2	Student records and processes are maintained in an efficient manner.
4.3	The ASC effectively communicates relevant student and policy information to faculty and staff.
4.4	High quality recruiting materials are produced and distributed.
4.5	High quality students are attracted to the programs.
4.6	High school/community college guidance counselors are visited, contacted, updated, or informed.
Goal 5 – Alumni Relationships Ensure strong alumni relationships.	
5.1	Alumni participate in College and University affairs, indicating a connection to the University.
5.2	Alumni provide financial support for the college.
5.3	Alumni support College activities and events.
Goal 6 – Program Support Ensure effective administrative support for a program.	
6.1	Administrative systems support faculty work and resource needs.
6.2	The college is successful in securing donations, gifts, equipment and scholarships.
6.3	Programs have the support needed for development.
6.4	Faculty members receive resources for research, scholarship, and professional development.
Goal 7 – Industry Relations Ensure effective industry relationships.	
7.1	Department Advisory Boards are in place and actively provide advice and opinions to the Department/program regarding curriculum, program offerings, and appropriate instruction.
7.2	Faculty members have established linkages with industry.
7.3	Industry donates equipment and/or funds in response to department needs.
7.4	Department Advisory Boards are in place and actively provide advice and opinions to the Department/program regarding curriculum, program offerings, and appropriate instruction.
Goal 8 – Faculty Ensure a strong faculty base.	
8.1	Faculty are engaged in appropriate scholarly and research activities.
8.2	Faculty are active in professional organizations.

8.3	College and Departments seek and report external support from public and/or private sources.
8.4	The college is competitive in attracting and retaining good faculty.

Note that some indicators include terms that require a careful definition, such as the word appropriate in indicator 1.3 and others. The intent of the committee was to provide more specific definitions through measures for each indicator.

Thus, next the committee identified ways to measure each indicator. ACI committee members recognized that each indicator would not necessarily have a separate unique measurement tool associated with it because the toll on college and departmental resources in implementing such a cumbersome system would be too great. Thus, in many cases an indicator measure would be derived from an instrument or tool designed to provide information for more than one indicator, and in some cases for more than one goal. At this point, ACI listed measurement tools which are in use by at least some component of the College and that could continue to by used in support of comprehensive assessment. The list represents items that would be most easily implemented in initial stages. These include the following items.

- Course and Instructor Evaluation Survey (CIES). The CIES is a survey instrument that has been used for a number of years to gather data about student satisfaction of courses and instructors. It is administered every regular semester and it is scored by the University Measurement and Evaluation Service. Their evaluation of the CIES indicates it is a reliable and valid instrument. Additionally, records and statistical analysis of components of the CIES are readily, though not always speedily, available. This measurement tool provides course-by-course data from which teacher and course effectiveness information can be gleaned.

- Capstone Courses. Upper level capstone courses with projects, research reports, and/or group activities provide opportunities to assess student performance with respect to total curriculum effectiveness and student skills. The courses should document student performance with respect to appropriate program competencies. Capstone course information will likely be both qualitative and quantitative.

- Employer Survey/Alumni Survey. The employer survey is an integral part of the alumni survey, which is ideally sent to the alumnus each year for the first five years after graduation. The alumni survey has questions with regard to student position, salary, permanent address, and satisfaction with education. Additionally, the alumnus is asked to suggest improvements to the curriculum. The Alumni are also asked to give an employer survey (with the signed permission of the alumnus to respond) to their respective employers. Each employer then answers questions with respect to their satisfaction with the alumnus' performance and education. The existing alumni/employer survey instruments have been used for many years with success. Both surveys are required by the engineering technology accrediting body, the Technology Accrediting Commission of the Accrediting Board for Engineering and Technology (TAC/ABET).

- Exit Interviews. The systematic exit interview will be a new form of information gathering at the College. To the extent possible, graduating seniors will be randomly

selected for exit interviews. The program coordinators or the department chairs will perform the interviews. They will be provided with suggested questions concerning the curriculum, instruction, facilities and student services. The person performing the interviews will summarize the responses.

- Graduating Senior Surveys. These surveys are provided to all graduating seniors. The questions are concerned with student perceptions of their curriculum. The questionnaires provide a point of reference for the exit interviews when perceptions can be explored further and confirmed. In addition future editions of the survey will address issues related to various academic services and educational experiences.

- Feedback from Industrial Advisory Boards. The minutes of industrial advisory board meetings and/or departmental summaries of the advisory board activities provide an indicator of industry opinion of program curriculum, industrial recognition, and industry acceptance of graduates.

- List of Program Competencies. The program competency list provides a benchmark with which to compare information from other evaluation instruments to discern Department and program health.

Thus, existing instruments and measurement tools that provide data for the comprehensive program assessment include three student surveys, one employer survey, exit interviews, minutes of meetings with industrial advisory committees, capstone courses, and a competency list per program. The evaluation instruments and measures contain information with which the results of other instruments can be compared for confirmation, or to indicate more information is needed. The reliability and validity of survey instruments will be established through the phased implementation of the system. The desired result is that departments and programs have enough information to make early corrections to impending problems, and a means to demonstrate their accomplishments.

Phased Implementation

Implementation of the process began in the 2002-2003 academic year. A measurement tool tested was the Graduating Seniors Survey. This survey explores both 1) the employment status of graduating seniors and 2) student perceptions of learning as related to program competencies. It is important to note that the survey does not measure learning; rather it measures student perception of learning.

In order to maximize the return rate, instruments were distributed and completed in senior courses. The response rate represents approximately 75% of graduating seniors. Responses from the survey were analyzed using descriptive measures. A relative frequency distribution of responses was developed and reviewed. Six of the items related to general areas that are common to all program areas. These items were analyzed by both program area and collectively for the college.

From the analysis, issues surfaced that exemplify the way in which this process can lead to a continuous improvement cycle. Examining the data led to questions that include the following.

- Are the common items ones that are truly addressed in common/required courses? If not, are they addressed individually in program areas? Should they be in common courses? Is the item of value? If it is not addressed in a common course(s), should it be deleted from the list of common items?
- Do other measures relating to the competency validate or support the results reflected in the survey? Were similar concerns expressed in the exit interview? Were the areas that ranked lower also showing up as problem areas in the capstone course projects? Did the projects demonstrate that students have an understanding of the information that ranked high on the scale? What courses are involved? How should they be changed or modified in order to improve student performance?

Exploration of employment areas addressed the following issues.

- Is the job placement generally appropriate for the student major? Are they involved in positions that require the knowledge reflected in the curriculum?
- Are graduates being hired by desirable and appropriate organizations? Are the reported salaries commensurate with the industry standard in the designated geographic region?

Thus, in addition to answering questions about the academic health of a program, assessment activities raise questions that encourage additional investigation. Such investigation can lead to a deeper understanding of the factors that influence the health of an academic program.

The phased implementation plan includes revising and retesting instruments, adding additional measurement elements annually. A data warehouse to house the data will be designed and built.

Program evaluation represents a long-term commitment. It is anticipated that as the process is incrementally implemented by the faculty, new issues will arise, plans will change, and instruments will be modified, developed and discarded. The whys and wherefores will more clearly emerge and continuously lead to program excellence.

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