RECENT ADVANCES IN ASSESSMENT OBSTACLE ANALYSIS

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Abstract - *Six years after ABET Engineering Criteria 2000 , the practice of assessment remains inconsistently applied in the United States across engineering programs both among institutions and within disciplines. If assessment is to succeed as a long-term strategy for ongoing measurement of outcomes and continuous improvement of student learning, the high levels of faculty resistance to the systematic assessment must be addressed. This may be accomplished by identifying obstacles and applying appropriate solutions once an understanding of the nature of trust in motives, questions, methods, and data as it concerns assessment is established. Investigating barriers to sustaining assessment, reporting perceived weaknesses in commonly used assessment methods, and identifying practical strategies to increase faculty trust in the collected data are the primary foci of this paper. This action research project details recent findings in assessment obstacle analysis among engineering faculty, institutional researchers, and assessment professionals in the United States.*

Index Terms ¾ Assessment, program evaluation, trust

INTRODUCTION

Many engineering faculty feel caught between the demands by accreditation authorities for evidence of student outcomes and the ability of faculty to engage in a process of documented and systematic improvement. In their eyes, they are not being adequately informed about the tasks required or given sufficiently trustworthy tools to engage in such a process. This paper provides a way out of the low-trust dilemma in a presentation of recent findings relative to assessment obstacle analysis. This is accomplished by exploring the nature of trust as it relates to assessment, and by investigating barriers to sustaining assessment, including the perceived strengths or weaknesses in selected assessment methods in engineering education. Practical strategies to increase faculty trust in the data acquired through commonly used assessment methods are provided.

LITERATURE REVIEW

Leadership is critical to establishing a foundation of trust as exhibited by shared concern and decision-making, reliability, open communication and explanations, and benevolence [1][2]. Campus leadership must manage trust by maintaining constancy of purpose and reliability of action [3][4]. Of course, open communications, commitment to common goals, leadership, budget practices, allocation of time, rewards, and other barriers to embracing assessment are also critical to the development and maintenance of organizational trust [5][6]. Unfortunately, the faculty of an academic department has few opportunities to effect institutional change. The importance of this research is to identify approaches that faculty can use to overcome barriers of either limited or no trust which may deter sustained programmatic assessment. The focus is on activities or strategies that faculty can use to take corrective action. With this in mind, the research focuses primarily on the assessment questions, methods, and data rather than motives of assessment.

METHOD

An action research methodology has been used throughout this project. Action research is an iterative form of social science research that involves ongoing rounds of data collection, collaborative analysis, exploration of the implications of findings with stakeholders, and actions to improve professional practice [7]. Three rounds of data collection, analysis, and discussion of the findings have been undertaken in this project so far and are reported upon here.

The first round of data collection took place in response to a specific institutional situation. The University Assessment Committee at a major research institution in the southern United States was interested in the culture of assessment as the university embarked on its self-study process for regional reaffirmation of regional accreditation. The Committee engaged in an environmental scan, the outcomes of which were recommendations to further examine the perception of assessment within the institution and to identify strategies to enhance institutional effectiveness. Through the support of a newly appointed president, the Office for Institutional Effectiveness and Assessment developed a workshop that included the deans, department chairs, and selected faculty. The participants identified characteristics of a culture of assessment infused with a low level of trust, and developed a series of recommendations on how to improve that situation. A

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preliminary inventory of best practices to build trust in assessment was created as a result [8].

Round two of data collection consisted of a workshop for faculty members in a College of Engineering at another research institution in the southern United States. Engineering faculty perceptions of trust in areas of assessment were explored at that time. A third opportunity for action research consisted of a workshop held at a regional institutional research and assessment conference in the southern United States. At that workshop, participants offered their views as institutional research and assessment professionals on perceptions of trust in aspects of assessment and collaboratively developed solutions to many of the trust dilemmas that surfaced. Results obtained from these three workshops are explored in the next section.

FINDINGS

Themes of Trust

Even within the limited range of these three workshops, a basic consensus has appeared [9]. Responses from participants of the three workshops clearly indicate support of the research of Schilling and Schilling [10] who identified four primary areas in which trust or lack of trust in assessment may exist among the faculty. First, the motives for collecting assessment data may be mistrusted. Second, the methods or instruments used in assessment may not be effective or efficient. Third, the questions raised through assessment may not be relevant to issues of interest to faculty, and thus not regarded as trustworthy. Finally, fear concerning the misuse or inappropriate interpretation of the data generated through assessment may lead to mistrust of assessment. A detailed summary of the workshop findings is set forth in Table I.

TABLE I
THEMES AND DESCRIPTIONS OF TRUST WITH ASSESSMENT PROCESS

MOTIVES
Participating in assessment is necessary but not sufficient to build trust.
Assessment results need to be used for purposes other than reporting. Agreement upon and identifying needs, strengths, philosophy should not be the responsibility of a single faculty member for the program. Using the results in a positive way will engage people and increase the trust in assessment. Using assessment data to increase development and recruiting opportunities stemming from well-founded bragging points.
Assuring that the assessment process and its results will not be used to hurt individual faculty members is important. This belief is the cornerstone: assuring the anonymous use of the data to examine the programs rather than to examine the individual student or the faculty member.
Establish a goal: Instill a culture of assessment and set routines within the department that will keep us actively enhancing what we do. One such realistic goal is the desire is to do a good job in collecting good data for program improvement.
QUESTIONS
Change the approach from 'safe' to 'meaningful' questions. Characteristics of safe questions: (1) The faculty not asking for resources and not spending time engaging with questions about student learning, (2) not taking risks: the outcomes will not require significant change, effort or resources. Identifying the real issues regarding student learning.
Changing the faculty attitude that is currently "fear" based. Faculty may be afraid to find out that they are not teaching effectively and would have to make changes. If faculty do not know that change is needed, then they do not have to take the time or make the effort to adjust current practices.
METHODS
Remove barriers to trust of the questions, processes, and motives for assessment. For example, develop a cycle of data gathering and reporting that is reliable and useful.
The individual: Participating faculty need to know that their collecting data and continuing to work on assessment would not be penalized.
The department/program: Actively participating in the process of data collection without results should not be punished as long as there is a plan for reporting and as long as results are coming.
Expand insight into student outcomes through new or modified strategies.
Use assessment instruments that reflect the unique content of the discipline.
DATA
Issues of data are linked with other areas of trust in assessment.
Consider the appropriateness of the data source in relation to the questions being asked. All feedback may not be meaningful even if it is accurate. If the educational objectives and outcomes are not clearly and properly defined, the resulting assessment data cannot be meaningful and will not be trusted.
Questioning data quality. (1) There are always questionable results (2) It is easy to measure a lousy job. For example, there are two possible data sources that are encumbered with limitations: small responses to surveys (bias), and grades (assess essential or central components of the discipline).

Rating Trust in Assessment Results

Faculty insights from the first workshop were confirmed by faculty participants in the second workshop, who were all from a College of Engineering. Faculty in the second workshop and institutional research professionals in the third workshop were asked to rate selected assessment tools in terms of how much they trusted the strategy to answer relevant questions and provide useful data [11, 12]. Comparative comments made by both groups are included in Table II.

TABLE II
SUMMARY OF LIMITATIONS AND ADVANTAGES OF METHODS: WHY DO YOU OR DON'T YOU LIKE IT

Assessment Method	Faculty	Institutional Researchers
Standardized Exam or Licensure Exam	*Limitation:* Not all students take it, content of material may not map to curriculum. *Advantage:* objective	*Limitation:* geographical applications. *Advantage:* standardized, Developed by peers. Can perform comparisons on regular basis with normative data.
Curriculum Display or Student Artifacts	*Limitation:* storage, Collection and storage issues, providing valid rating. *Advantage:* direct measure.	*Limitation:* Tough to do in large situation, subjective evaluation, concentrates power with faculty. *Advantage:* Authentic performance rated by faculty and reviewed by peers so therefore valid. Definite output with relationship to content of instruction / questions.
Performance Appraisal: Co-Op Student, Supervisor Reports	*Limitation:* Variability, no control over the raters and their interpretation.	*Limitation:* Bias, too much vested interest, subjective, evaluation disconnect between supervisor evaluation and faculty need for information. *Advantage:* Propel curriculum changes, contingent on discipline, demonstration of skills required to do a job
Accreditation Review by discipline peers	*Limitation:* Motives of reviewers, faculty may not interact with results.	*Limitation:* Contingent on discipline and agency, primary motive is fear. *Advantage:* High validity, external peer review.
Interview: Student advisory committee, graduating students	*Limitation:* All volunteers, self-selected, bias timing, honesty of results. *Advantage:* Use consultant, cross-section of students.	*Limitation:* Hard to schedule for large schools, could be handled at department level; self reports, not anonymous, bias potential, faculty are not in objective position to do interview. *Advantage:* Gives easily obtained viable information.
Surveys: Exit, Career, Employer, Alumni	*Limitation* No differentiation between departments in the data.	*Limitation:* Can be campus level and program specific, self report, limited to graduating students, expensive, low response rate, bias. *Advantage:* Each should develop their own, candid, reflective of college experience.
Student Placement Data after Graduation	*Limitation:* Overall, small measure of current student knowledge, tertiary data.	*Limitation:* Level of data, source, important but difficult to administer and quantify.

As is evident, the two groups identified reasons to support or question a number of common assessment methods. They were asked to rate their level of trust for each method. The responses were categorized into three general levels of trustworthiness. The summary in Table III is based on a scale where high trust represents a good fit between the tool and the needs for information and low trust a lack thereof. Assessment methods that are standardized or structured according to regional or national criteria (e.g., licensure exam results or transcripts) were ranked highest by institutional research professionals -- but faculty rated standardized examinations such as the Fundamentals of Engineering Exam (FE) as being in their second level of trust. Engineering faculty recognized that the analysis of FE examination results and transcripts should not be the sole, and perhaps are not the best, strategies for assessing student learning.

Faculty rated their highest level of trust in student works or artifacts, those assessment strategies developed or administered and interpreted by the departmental faculty. Institutional research professionals rated student artifacts in their second tier of trust along with accreditation review by peers in a discipline and student-reported information (placement data, exit surveys or interviews).

External advisory, student advisory and alumni survey information was ranked by institutional research professionals as being least trustworthy. This is similar to the ranking of the faculty, who held the least amount of trust in self-reported information from students or alumni. Faculty also rated employer evaluations, including evaluations of co-op students, at their lowest level of trust. Note, however, that employer surveys for program assessment were rated in the highest trust level by institutional researchers.

TABLE III

SUMMARY OF TRUST-RATING OF ASSESSMENT STRATEGIES

Level of Trust	Faculty	Institutional Researchers
Highest	Student artifacts -- those assessment strategies developed or administered and interpreted by the departmental faculty (portfolios or exhibits, papers, projects).	Standardized examinations, Professionally reporting guidelines, and self reported or information from employer evaluations -- (licensure exam results, transcripts according to regional, national, or professional criteria, evaluations of co-op students or alumni).
Middle	Standardized examinations -- such as the Fundamentals of Engineering Exam (FE).	Accreditation review by peers in a discipline, Student artifacts, and Student-reported information (portfolios or exhibits, placement

		data, exit surveys or interviews).
Lowest	Self-reported information from students or alumni and that gathered from employer evaluations including evaluations of co-op students or alumni.	Self-reported information from students or alumni (only).

Differences between the responses of the faculty and the institutional researchers could be attributed to several factors. The role of these two groups within the institution is different; therefore, the perspective that each has regarding collection and use of data will reflect its role. For example, institutional researchers generally hold a broad, university-wide view while faculty predominately focus on their discipline. Although both groups may be well-trained researchers, their use of the data differs. Examination of desired student outcomes of a specific curriculum requires different information than would be used to examine institutional graduation rates. In addition, the influence of variability and reliability in assessment methods may be a driver of how the faculty or institutional researchers rated their trust of the strategies for decision making. The level of direct contact a supervisor or employer may have to observe performance of a graduate may affect the reliability of the information reported on a survey from the faculty perspective. The preliminary research indicates that that the faculty and institutional research groups do not differ extremely among institutions in the role that they play within their institution; however, there appear to be discipline-based attitudinal differences between the two groups.

Practical Strategies for Increasing Trust

Identifying practical strategies to increase trust in assessment data was a third workshop activity. Some of the suggestions clearly indicated the desirability of program faculty involvement in the development and/or use of the instruments. For instance, institutional research professionals stated that exit interviews or surveys should be developed by the departments rather than by a university Office of Institutional Research. This group also noted that Feedback from alumni should be obtained on specific program characteristics that are identified by department faculty and are included as a separate section in general university alumni or employer surveys.

Both institutional research professionals and engineering faculty suggested developing a rubric for scoring student artifacts to increase the validity of the ratings. According to both groups, co-op student supervisor or employer evaluations could be improved by developing standardized evaluation measures and providing common definitions of employee skills for all raters.

Employment placement data are generally reported by alumni. Institutional research professionals suggested direct faculty contact by e-mail with the alumni as a way to increase the response rates of alumni surveys thereby increasing the reliability of the data. Faculty workshop participants offered no suggestions as to how to increase the trustworthiness of placement data, which they consistently viewed as untrustworthy for program decision making. Suggestions advanced are detailed in Table IV.

TABLE IV
SUGGESTIONS FOR SHARPENING ASSESSMENT TOOLS AND INCREASING TRUSTWORTHINESS

Assessment Tool	Faculty	Institutional Researchers
Standardized Exam or Licensure Exam	Video tape preparation or self-paced online prep course for self-examination. Reinforce material throughout the curriculum.	Satisfactory as it is. Keep current, criterion based to fit the local needs. Make sure text is better understood and data are shared.
Curriculum Displays or Student Artifacts	Summarize and store the evidence from designated courses. Allow students to participate in the assessment process and use evidence as an exam resource.	Sample students. Use standardized rating rubrics to remove bias, make less subjective. Implement clear guidelines for product development.
Performance Appraisal: Co-Op Student, Supervisor Reports	Develop several questions related to specific skills, ethics, or values. Provide definitions of each rating for the raters.	Pairing of interview and survey. Create standardized evaluation measure striving for consistent more objective measures. Use third unbiased person to prepare report. Use only in a gross way to ID if same student gets bad reports from every place, or if it's all students. Be sure supervisor has appropriate knowledge to assess student, basic template used across disciplines, training supervisors on rating instrument.
Accreditation review by discipline peers	Do a better job getting results out to faculty. Look at program objectives, identify capstone projects, identify areas to develop curriculum/new courses.	Update criteria for assessment and evaluation.

Interview: Student advisory committee, graduating students	In advising or seminar course: talk to them about their role in giving feedback. Differentiate by department. Students interview peers rather than faculty/administrators interview students Students tend to be at an advanced level – need cross-section.	Keep it at department level. Departments use it to validate what they do. Training in interview methodology. Need balance of non-anonymous data. The interviewer can focus, and can probe for both sides of issues. Ask more objective questions – questions have never been assessed. If possible, use incentives for completion. Structure more like a focus group instead/ avoid biased interviewer via methodology training; interview conducted by personnel from a different department or discipline.
Survey: Exit, Career, Employer, Alumni	Build rapport: give company feedback on contents of surveys that would reflect faculty concerns. Differentiate by department.	Disaggregate the data, cross tabs on categories and years since graduation. Work with national data base, i.e., Department of Labor. Engage with external Advisory committees to build trust. Target surveys to universal skills, not job functions. Bring in work ethic, other soft skills. Follow up with telephone calls to those who have not responded. Assessment or Institutional Research Office sends survey (not alumni office). Use comparison with [NCES] baccalaureate and beyond, use the web or email.
Student Placement Data after Graduation	No suggestions.	Use e-mail more.

Having explored the nature of trust as it concerns assessment processes, the next step is to understand barriers to developing trust in assessment. Barriers to the assessment process must be identified and systematically neutralized if assessment is to succeed as a long-term strategy for ongoing measurement of processes and outcomes, and continuous improvement of student learning systems. Through the three workshops described above, department chairs, faculty, and institutional research professionals have identified the barriers to systematic assessment practices displayed in Table V. These are classified within three themes: attitude, knowledge, and practice.

TABLE V
EXAMPLES OF BARRIERS TO SYSTEMATIC ASSESSMENT ACCORDING TO FACULTY AND INSTITUTIONAL RESEARCHERS

Type of Barrier	Faculty	Institutional Researchers
Attitude	Lack of 'buy in', 'commitment', or 'motivation'; indifference, resistance, and hostility toward assessment. Assessment viewed as 'administrative nonsense,' distracting. No link between actual outcomes and assessment.	'Indifference, resistance, and hostility' toward assessment. No faculty buy-in, lack of Commitment. Faculty lack motivation, indifference by tenured faculty. Turf issues. Culture does not value sustainability.
Knowledge	Faculty and Institutional Researchers both stated: Turnover in personnel results in loss of institutional memory. Not knowing what needed to be evaluated is a problem. Responding to compliance rather than the desire for program improvement.	Not understanding the necessity of using results, or just not using results. Faculty realize the necessity but do not know how to use the process, a misunderstanding of roles is evident. Identifying what needs to be assessed: too much detail, missing the big picture.
Practice	Faculty and Institutional Researchers both stated: Institutional leadership does not support assessment momentum after an accrediting body leaves. No evidence of change or improvement due to assessment. No link between assessment results and budget allocations.	Open up communication. Making the process meaningful. Not meeting deadlines. Lack leadership for assessment (VP level or above).

Barriers to ongoing use of assessment activities for continuous programmatic improvement can be overcome. From the action research process described in this paper, the authors have extracted characteristics of what appear to be low-trust and high-trust environments for assessment. Levels and general aspects of trust are shown in Table VI. These reflect the characteristics identified by faculty, assessment, and the institutional research professionals.

TABLE VI
ASPECTS OF TRUST IN ASSESSMENT AS CHARACTERIZED IN LOW- AND HIGH-TRUST ENVIRONMENTS

Aspect of Trust	Low-Trust Environment	High-Trust Environment
Trust in the motives	Belief that data will be collected ostensibly for one purpose, but used somehow to punish faculty.	Linkage evident between university, college and department plans. Instill culture of assessment, routines keep focus on enhancing what to do.
Trust in the questions	'Safe' questions asked whose outcome will not require change.	Meaningful questions asked in assessment to investigate aspects of teaching and curriculum effectiveness.
Trust in the methods	Inadequate methodological basis. Role of faculty in process unclear. Required short-term orientation for reporting results of assessment projects and activities.	Sound methodological frameworks; faculty participate in developing approaches and selecting/developing instrumentation. Using familiar format for reporting. Sense of faculty ownership in process and knowledge of how individual

	Methods are not sufficiently rigorous.	efforts contribute to the whole. Longitudinal, multi-year projects undertaken that may take several years to report. Departmental time line developed, and assessment incorporated throughout yearly activities.
Trust in the data	Low response or participation rates on surveys lead to unusable data. Grades are unstable and don't provide actionable data.	Clear linkage between data source and appropriate question being asked. Use of Primary Trait Analysis to disaggregate grading data into central components of the discipline.
Leadership support	Little or no public support. Avowed assessment purposes not linked to priorities as expressed in initiatives or budgeting. Assessment results not shared with institution.	Strong, public support. Sharing of data and participatory decision making. Consistency and reliability. Recognition and rewards provided for initiative in assessment projects.
Fear orientation	Punishment for asking difficult questions. Hearing bad news. Finding out that one's teaching is ineffective.	Risk-taking and engagement with questions of teaching and learning encouraged and rewarded. Increasing disclosure and asking for help – asking and sharing.
Planned change orientation	Members unwilling to participate in introspective processes and unwilling to admit possibility of need for change. Vision of faculty role as solo contractor.	Linking results to mission. Agreeing upon and identifying needs, strengths, philosophy. Vision of faculty role includes larger institutional responsibility and goal-setting.

DISCUSSION

This beginning has lead to discoveries of challenges as well as opportunities. We are convinced that sustainable assessment processes requires trust in all areas: motives, questions, methods and data. Some impediments to trust will be removed if modifications can be made to assessment methods. However, other barriers such as leadership and trust in motives will require different changes to foster trust. Periodic reconsideration of the assessment process and the context in which it is implemented is critical. A department needs to assess the degree program and modify the curriculum and practices…as well as evaluate the departmental assessment climate. To be sustainable, the implementation of an assessment plan must occur in an environment of trust. Make assessment strategies understandable and easy to use -- and perhaps more importantly, make sure that fellow faculty are engaged in coming to consensus on trust of the questions being asked, the motives for asking those questions, the methods of gathering data, as well as the data itself and how best to make use of it in "closing the loop." Using these methods enables us to move past the dilemma of low trust towards higher trust in and sustainability of assessment processes.

REFERENCES

[1] Whitener, Ellen M., Brodt, Susan D., Korsgaard, M. Audrey, & J.M. Werner, Managers as Initiators of Trust: An Exchange Relationship Framework for Understanding Managerial Trustworthy Behavior. *Academy of Management. The Academy of Management Review, 23,* 513-530.

[2] Shockley-Zalabak, Pamela, Ellis, Kathleen, & Winograd, G. (2000). Organizational Trust: What it Means, Why it Matters, *Organizational Development Journal, 18,* 35-48.

[3] Shaw, R.B. (1997). *Trust in the Balance*. San Francisco: Jossey-Bass. As cited by S. K.Hacker, L. Couturier, & M. E. Hacker, The Trust Requirement in Advanced Manufacturing Systems. The Performance Center, Department of Industrial and Manufacturing Engineering, Oregon State University, 1999. http://www.performancecenter.org/research/Trust%20Requirement.html.

[4] Parsons, Michael H. (1991) *Enhancing Teaching-Learning Environments: A Change in Management Strategy*, Eric Document Reproduction Service, ED333926.

[5] Acherman, Hans A. (1993). Building on External Quality Assessment to Achieve Continuous Improvement. In Deborah J. Teeter & Gregory G. Lozier, (Eds.), *Pursuit of Quality in Higher Education : Case Studies in Total Quality Management. New Directions for Institutional Research*, No. 78, 31-35.

[6] Gilbert, Jacqueline A., & Tang, Thomas L. (1998). An Examination of Organizational Trust Antecedents. *Public Personnel Management, 27,* 1998, 321-339.

[7] Collaborative Action Research Network, *Outline Statement*, at http://www.triangle.co.uk/ear/ retrieved on 6/26/02.

[8] Hoey, J. J. and Nault, E. W. Trust: The Missing Ingredient in Assessment. *International Journal of Engineering Education*, 18, 2, 117-127.

[9] Hoey, J. J. and Nault, E. W. (October 14, 2001). Keeping the Assessment Momentum, workshop presented at 2001 Conference, Southern Association of Institutional Research, Panama City Beach, FL, USA.

[10] Schilling, Karl & Schilling, K.M. (1998). *Proclaiming and Sustaining Excellence: The Faculty Role in Assessment.* ASHE/ERIC Report, Washington, D.C.

[11] Nault, E.W. and Hoey, J.J. (2001). *Trust: Essential to Successful Assessment.* International Conference of Engineering Education, August 6, 2001

[12] Nault, E.W. and Hoey, J.J. (2001). *Trust: Essential to Effective Assessment*. Frontiers in Education, October 11, 2001.