

AC 2007-15: THE THREE R'S OF ASSESSMENT: RECORDING, REVIEWING AND REPORTING.

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DR. MYSORE NARAYANAN obtained his Ph.D. from the University of Liverpool, England in the area of Electrical and Electronic Engineering. He joined Miami University in 1980 and teaches a wide variety of electrical, electronic and mechanical engineering courses. He has been invited to contribute articles to several encyclopedias and has published and presented dozens of papers at local, regional, national and international conferences. He has also designed, developed, organized and chaired several conferences for Miami University and conference sessions for a variety of organizations. He is a senior member of IEEE and is a member of ASME, SIAM, ASEE and AGU. He is actively involved in CELT activities and regularly participates and presents at the Lilly Conference. He has been the recipient of several Faculty Learning Community awards. He is also very active in assessment activities and has presented more than a dozen papers at various Assessment Institutes. His posters in the areas of Bloom's Taxonomy and Socratic Inquisition have received widespread acclaim from several scholars in the area of Cognitive Science and Educational Methodologies. He has received the Assessment of Critical Thinking Award twice and is currently working towards incorporating writing assessments that enhance students' critical thinking capabilities.

Ronald Earley, Miami University

The Three R's of Assessment: Recording, Reviewing and Reporting.

Abstract

Psychologist Lauren B. Resnick, Director and Senior Scientist of Learning Research and Development Center at the University of Pittsburgh has carried out extensive research in the area of cognitive science with particular attention to student learning, instructional delivery styles and assessment. Dr. Resnick who is world famous for her research in the area of assessment, indicates : *What we assess is what we value. We get what we assess, and if we don't assess it, we don't get it.* Students must be encouraged to take charge of their own learning responsibilities and organize their educational programs and activities.

It is important that faculty members aspire to become masters of cognitive studies. (Forrest, 1990). They should be motivated and be driven to develop scholarship of pedagogy and a curriculum structure that can draw upon and embody learning principles. (Huba & Freed, 2000). For example, the Wharton School of the University of Pennsylvania has embarked on a mission to educate students with a broader perspective. (Narayanan, 2004). They are encouraging students to become more open-minded and well articulated. Their objective is to generate a new generation of effective leaders that can make a dent in the global marketplace. (Nichols & Nichols, 2001).

In this poster presentation, the authors attempt to outline specific methods to record, report and review assessment data, that would help instructors document certain aspects of student's educational accomplishments.

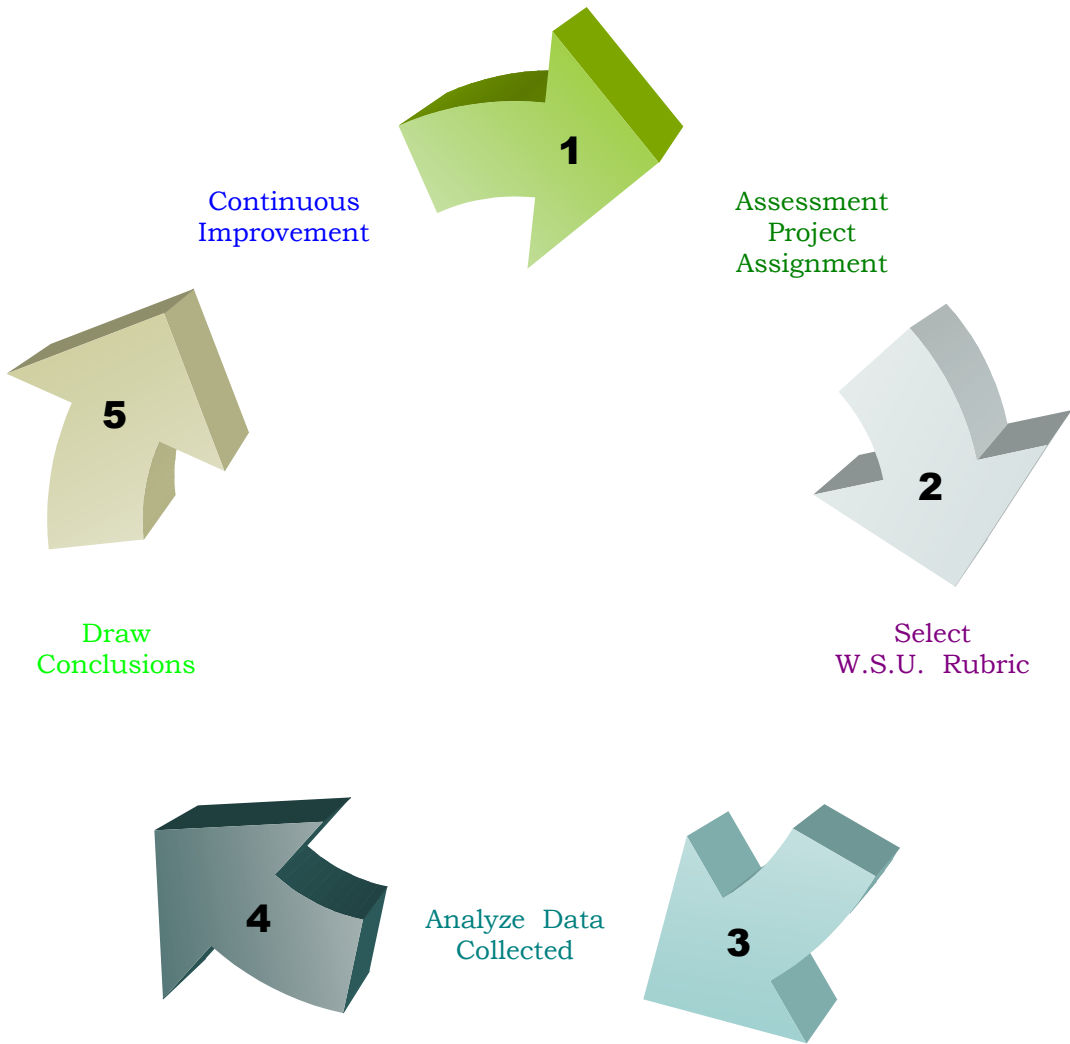
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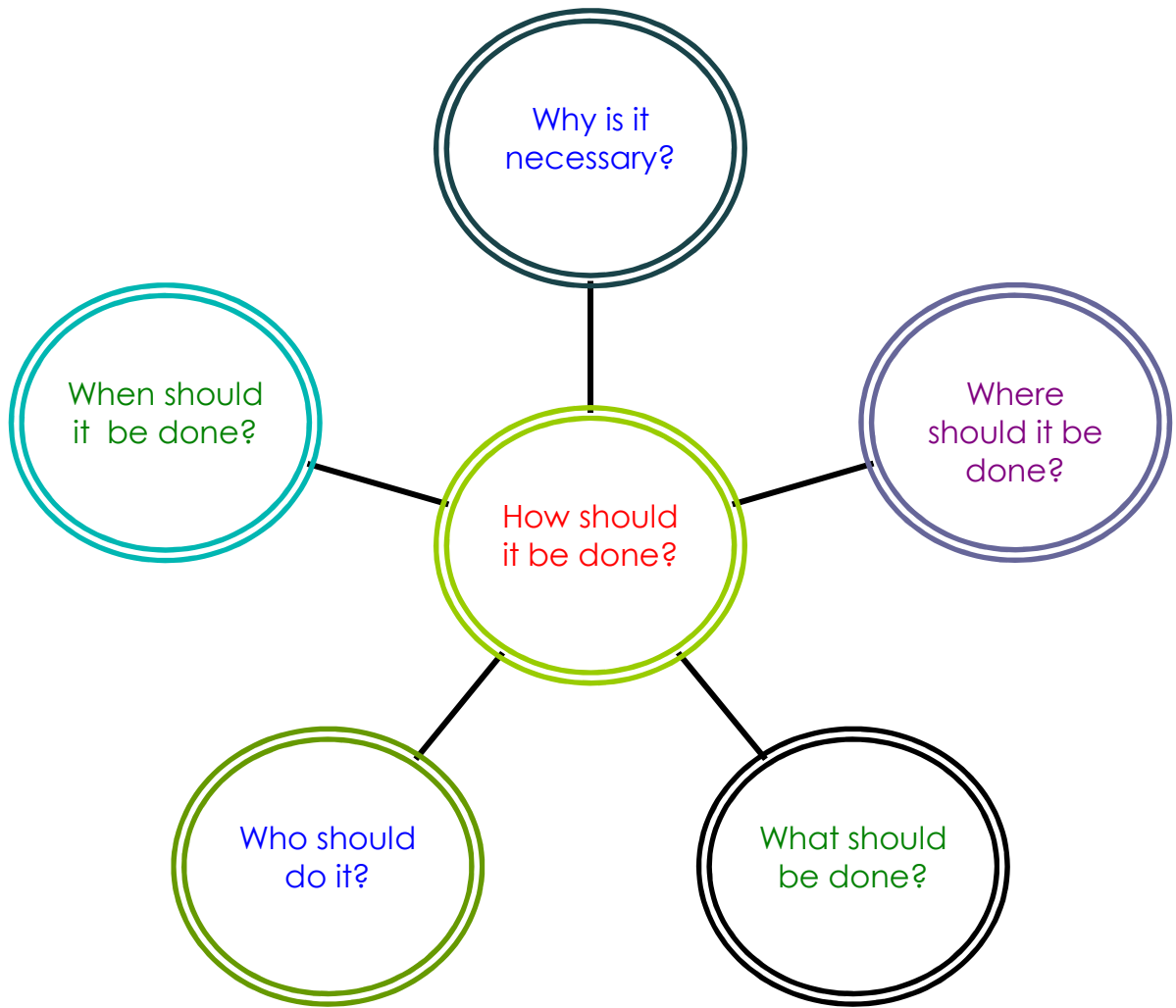
Forrest, A. (1990). *Time will tell: Portfolio-assisted assessment of general education.* Washington, DC: American Association for Higher Education.

Huba, Mary E. and Freed, Jann E. (2000). *Learner-Centered Assessment on College Campuses.* Massachusetts, Needham Heights : Allyn & Bacon.

Narayanan, Mysore (2004). *What is Assessment ? A different point of view.* Pomona California : California State Polytechnic University : 16th Annual Lilly Conference on College & University Teaching – West.

Nichols, James O. & Nichols, Karen W. (2001). *The Nichols Guides to Institutional Effectiveness and Student Outcomes Assessment.* Flemington, New Jersey : Agathon Press.





An Assessment Rubric

TOTAL No. of STUDENTS:

A B Y Z

MEDIAN	MODE	AVG.
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LIKERT SCALE WEIGHT DISTRIBUTION :

(1 : Strongly Disagree; 5 : Strongly Agree)

1	Content and Material : Background Knowledge									
2	Research : Relevant and up-to-date									
3	Development : Scientific Approach									
4	Audience : Keeps them in focus									
5	Purpose : Achieves attainable goals									
6	Context : Influence of multiple sources									
7	Organization : Well-structured paragraphs									
8	Mechanics : Grammar, Synthesis, Development									
	Rubric Courtesy of W.S.U., Pullman, WA.									

The data collected are ordinal: they have an inherent order or sequence, but one cannot assume that the respondent means that the difference between agreeing and strongly agreeing is the same as between agreeing and being undecided.

Descriptive Techniques

Summarize using a median or a mode (not a mean); the mode is probably the most suitable for easy interpretation.

Express variability in terms of the range or inter quartile range (not the standard deviation).

Display the distribution of observations in a dotplot or a barchart (it can't be a histogram, because the data is not continuous).

Course XYZ : LIKERT SCALE ANALYSIS

Source: <http://ent.ham.muohio.edu/ent%20497%20498%20earley>

Student #

A	B	C	X	Y	Z	MEDIAN	MODE	AVG.
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I CRITICAL THINKING SKILLS : This course has :

1	enhanced my abilities to think critically.																			
2	assignments designed to sharpen critical thinking skills.																			
3	stressed logical thinking and not just memorizing.																			
4	problem solving techniques that utilize critical thinking.																			
5	writing projects that encourage critical thinking.																			

II UNDERSTANDING CONTEXTS : This course helped me :

6	understand the positive and negative consequences of a design.																			
7	appreciate some of the ethical issues faced by engineers.																			
8	determine the cost/benefit analysis of a design project.																			
9	rationalize the manner in which design engineers think and act.																			
10	become more sensitive to the consequences of implementing a design.																			

III ENGAGING WITH OTHER LEARNERS : This course has :

11	class activities to promote engaging with other learners effectively.																			
12	improved my ability to work and solve problems with other learners.																			
13	stressed the importance of group work for engineers.																			
14	helped me learn things I did not know by working with my peers.																			
15	helped me to improve my communication and listening skills.																			

IV REFLECTING AND ACTING : This course :

16	is structured so that I can reflect upon the concepts I have learnt.																		
17	helps me to reflect upon the concepts & apply them judiciously.																		
18	helped me understand the need to reflect before implementation.																		
19	helped me to account for multiple aspects of an engineering design.																		
20	helped me to reflect before acting in other areas of my life as well.																		

V CHARACTERISTICS WAYS : This course has me understand :

21	the need for problem definition, before actually solving it.																		
22	the advantages of well-structured design methodologies.																		
23	the importance of meeting users needs while designing a project.																		
24	the safety rules and O.S.H.A. regulations in design practice.																		
25	the value of logic and the power of reasoning.																		

WSU'S CRITICAL THINKING RUBRIC

1. Identifies, summarizes (and appropriately reformulates) the problem/question/work assignment.

This dimension focuses on task or issue identification, including subsidiary, embedded, or implicit aspects of an issue and the relationships integral to effective analysis.

2. Identifies and considers the influence of context and assumptions.

This dimension focuses on scope and context, and considers audience of the analysis. Context includes recognition of the relative nature of context and assumptions, the reflective challenges in addressing this complexity and bias, including the way ethics are shaped by context and shape assumptions

3. Develops, and communicates OWN perspective, hypothesis or position.

This dimension focuses on ownership of an issue, indicated by the justification and advancement of an original view or hypothesis, recognition of own bias, and skill at qualifying or integrating contrary views or interpretations.

4. Presents, assesses, and analyzes appropriate supporting data/evidence.

This dimension focuses on evidence of search, selection, and source evaluation skills--including accuracy, relevance and completeness. High scores provide evidence of bias recognition, causality, and effective organization.

5. Integrates issue using OTHER (disciplinary) perspectives and positions.

This dimension focuses on the treatment of diverse perspectives, effective interpretation and integration of contrary views and evidence through the reflective and nuanced judgment and justification.

6. Identifies and assesses conclusions, implications, and consequences.

This dimension focuses on integrating previous dimensions and extending them as they explicitly and implicitly resolve in consequences. Well developed conclusions do more than summarize. They establish new directions for consideration in light of context and the breadth and depth of the evidence.

7. Communicates effectively.

This dimension focuses on the presentation. If written, it is organized effectively, cited correctly; the language use is clear and effective, errors are minimal, and the style and format are appropriate for the audience.

Source: <http://wsuctproject.wsu.edu/ctr.htm>

Possible Venues for Documenting Assessment

Assessment Tool	High	Medium	Low	None
In-class Examinations				
Take-home Examinations				
Laboratory Reports and Exams				
Oral Examinations				
Short Quizzes				
Multiple-choice Tests				
Problem Solving Exercises				
Short Essay Assignments				
Extended Writing Assignments				
Oral Presentations				
Student-led Seminars				
Research Reports				
Design Project Write-up				
Computer-based Assignments				
Co-op Work Placement Reports				
Descriptive Learning Logs				
Learning Portfolios				
Poster Presentations				
Individual Projects				
Group Projects				

Reference : Student Assessment in Higher Education.

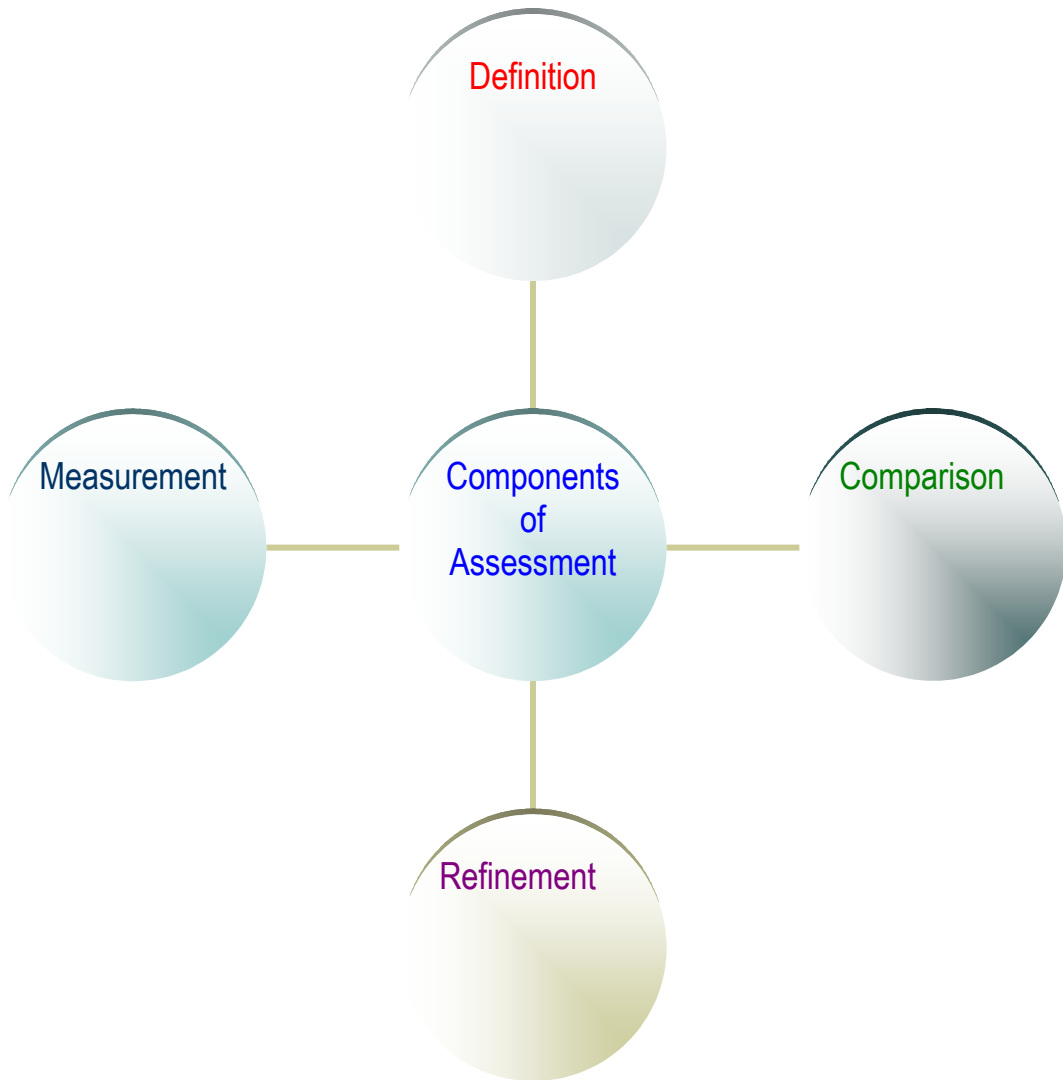
A Handbook for Assessing Performance.

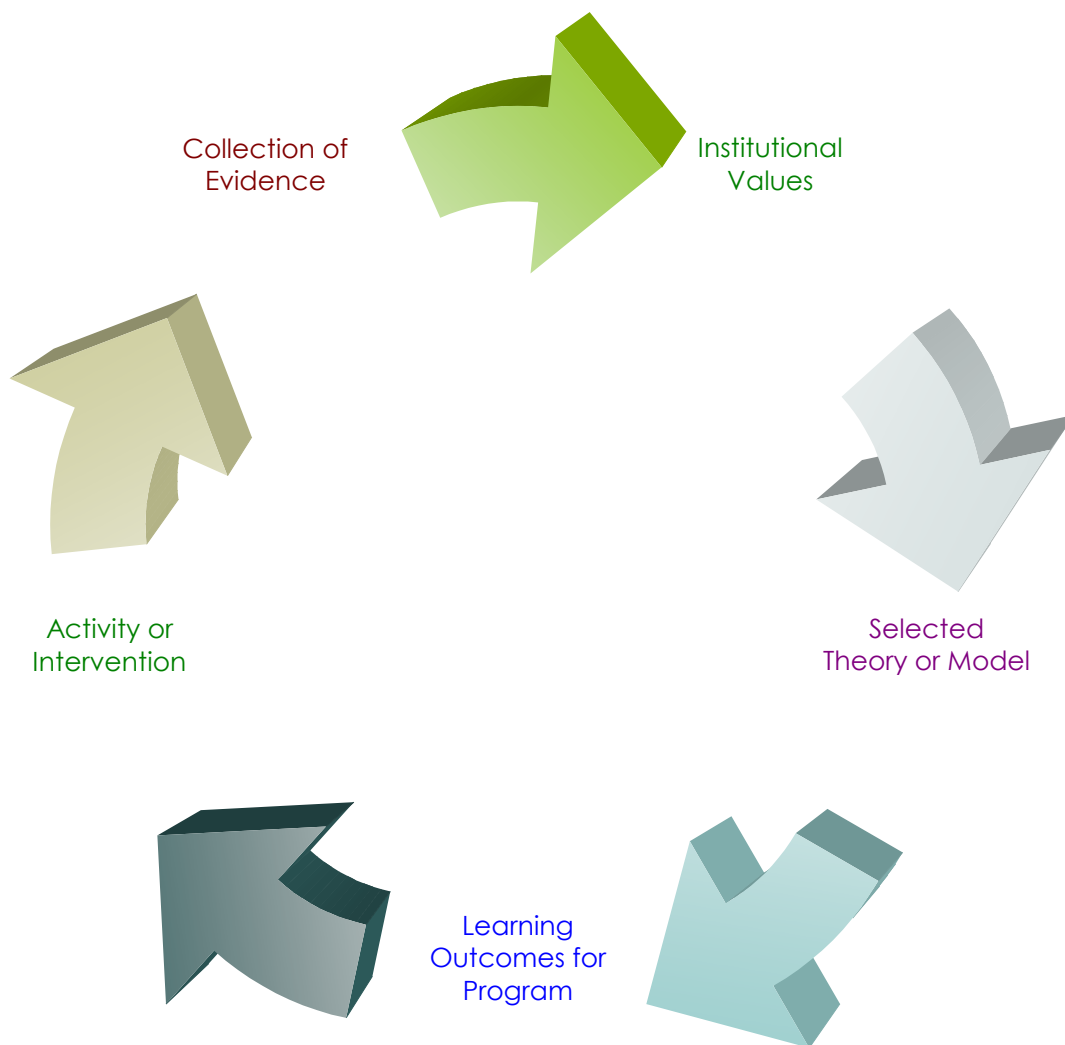
Authors : Kevin Cox, Allen Miller and Bradford Imrie 1998 Kogan Page.

Students' Written Communication Skills: Some Questions to ask.

1. I think about how my papers will sound to someone else.
2. I know how to evaluate and revise my papers.
3. I prefer courses that don't require much writing.
4. I am able to organize my ideas well when I write.
5. I am comfortable letting other people give me feedback on my writing.
6. I am confident in my knowledge of English grammar.
7. I will need to be able to write well after college.
8. I am able to collect and organize information for my writing.
9. I am able to communicate ideas effectively in writing.
10. I can write persuasively.
11. I know how to find resources to help me with my writing.
12. I find it difficult to understand what writing assignments are asking for.
13. I seek help on my writing from others.
14. I am aware of different ways of organizing a paper.
15. I have a hard time figuring out how to approach a writing assignment.
16. I am able to identify a clear purpose when I write a paper.
17. I am confident in my writing ability.
18. I am able to write papers that professors like.
19. I am able to express my knowledge clearly through writing.
20. I am comfortable with the kind of language used in college writing.
21. My prior education has prepared me for the written work required in my courses.
22. When I write, I think about who is going to read it.
23. I could benefit from more writing instruction.

Source: Courtesy of Libby Barlow & Dudley Reynolds, University of Houston





Part of a Report Submitted to Miami University

Assessment of Critical Thinking – II Project

Fall 2005

Dr. Mysore Narayanan

MIAMI UNIVERSITY, Ohio.

Preamble

Provost David L. Potter of George Mason University chaired a joint task force and presented a report entitled “Powerful Partnerships : A Shared Responsibility for Learning” in June 1998. It begins with a statement of the insights gained through the scholarly study of learning and their implications for pedagogy, curricula, learning environments, and assessment. The main goal is to make a *difference* in the quality of student learning. Further, it is important to assess this *difference* and document it. (Narayanan, 2003, 2004 a, b, c, d, e)

According to guidelines proposed by the American Association for Higher Education (AAHE Assessment Forum, 1992), Assessment requires attention to outcomes but also and equally to the experiences that lead to those outcomes. Information about outcomes is of high importance; where students "end up" matters greatly. But to improve outcomes, we need to know about student experience along the way-about the curricula, teaching, and the kind of student effort that lead to particular outcomes. Assessment can help us understand which students learn best under what conditions; with such knowledge comes the capacity to improve the whole of learning.(Cerbin, 1992a)

One of the most critical connections in students' education-the link between teaching and learning-is often overlooked in assessment practices. Assessment focuses on either learning or teaching but not on the interplay between the two.(Assessments of learning typically document students' knowledge but do not examine how classroom practices contribute to earning outcomes. (Cerbin, 1992b).

Traditional methods for evaluating teaching examine instructional practices but often ignore how those practices influence students' learning, thinking, and development. Even portfolio assessment approaches, which document teaching and learning more fully, do not necessarily examine the interplay between the two.(Cerbin, 1992c). Teaching portfolios may contain evidence of students' learning, but such information is optional, and when included, it may be only one of many pieces of material (Edgerton, Hutchings, & Quinlan, 1991; Seldin, 1991). Student portfolios, which document learning

in more detail, seldom reveal how teaching contributes to students' progress (Forrest, 1990). Traditional methods of assessment certainly contribute to the improvement of education. However, practices that separate teaching from learning increase the chances that faculty members will perceive both types of assessment as irrelevant to their day-to-day classroom work. (Edgerton, Hutchings, & Quinlan, 1991).

Assessment practices throughout the country are in a state of rapid transition. Revised ideas are designed and geared so that the documentation of the desired competency in a portfolio. These newer assessment practices are intended to be more authentic, that is, to involve students in the actual or simulated performance of a task or the documentation of the desired competency in a portfolio (Linn, Baker, & Dunbar, 1991).

The question is, "How can we continuously assess the performance of our individual students?" Student performance measures should include skills that clearly show their progress through a sequence of preservice professional development activities and, thus, demonstrate growth. The process of developing a method for assessing this continuous growth requires thoughtful planning (Greenwood & Maheady, 1997).

Assessment techniques should always include multiple evaluation methods that examine the course curriculum content in depth. One such tool is a complete and thorough examination and analysis of student course portfolio. Customer feedback must be considered crucial and this can be obtained through questionnaire sent to employers. Further, 'Job Placement Surveys' can be sent to graduates inviting them to provide the department, with their perspective of the *quality* of education they have received. (Anderson 1993).

Many science and engineering disciplines and departments utilize the feedback obtained from experts from industry, who may sit on an *Industrial Advisory Council* for the School. Alumni surveys can be conducted at regular intervals, such as five years after graduation, ten years after graduation, etc. A *student advisory council* may be helpful, however, in many instances, it has been observed that students may use this as a vehicle to *vent* their displeasure and frustration, instead of forthcoming with productive and creative suggestions. Exit interviews of students who are about to graduate may provide an insight, however this again has to be taken with a grain of salt because of the inexperience and immaturity of the students who have not set foot in the real industrial world. Suitably designed evaluation methods, if administered properly in the classroom may provide some insight towards assessment. In addition, adherence to the goals and objectives of benchmarked institutions is essential.

References:

- AAHE Assessment Forum. (1992). *Principles for good practice for assessing students' learning*. Washington, DC: American Association for Higher Education.
- Anderson, E. (Ed.). (1993). *Campus use of the teaching portfolio: 25 profiles*. Washington, DC: American Association for Higher Education.
- Cerbin, W. (1992a). *A course portfolio for educational psychology*. (Available for \$5 from William Cerbin, Center for Effective Teaching & Learning, University of Wisconsin-LaCrosse, 1725 State Street, La Crosse, WI 54601)
- Cerbin, W. (1992b). *How to improve teaching with learning-centered evaluation*. *The National Teaching and Learning Forum*, 1(6), 8-9.
- Cerbin, W. (1992c, November). *Using course portfolios to enhance teaching and learning*. Paper presented at the 12th Annual Lilly Conference on College Teaching, Miami University, Oxford, OH.
- Cerbin, W. (1993). *Fostering a culture of teaching as scholarship*. *The Teaching Professor*, 7(3), 1-2.
- Edgerton, R., Hutchings, P., & Quinlan, P. (1991). *The teaching portfolio: Capturing the scholarship in teaching*. Washington, DC: American Association for Higher Education.
- Forrest, A. (1990). *Time will tell: Portfolio-assisted assessment of general education*. Washington, DC: American Association for Higher Education.
- Greenwood, C., & Maheady, L. (1997). *Measurable change in student performance : Forgotten standard in teacher preparation?* *Teacher Education and Special Education*, 20 (3), 265-275.
- Linn, R., Baker, E., & Dunbar, S. (1991). *Complex, performance-based assessment: Expectations and validation criteria*. *Educational Researcher*, 20 (8), 15-21.
- Narayanan, Mysore (2003). *Assessment in Higher Education: Partnerships in Learning*. Oxford, Ohio. : Miami University: 23rd Annual Lilly Conference on College Teaching.
- Narayanan, Mysore (2004 a). *What is Assessment? A Different Point of View*. Pomona, CA. : California Polytechnic University : 16th Annual Lilly Conference on University & College Teaching – WEST.
- Narayanan, Mysore (2004 b). *A Learner-Centered Student Course Portfolio*. Charlotte: North Carolina. Proceedings of **2004** ASME Heat Transfer/Fluids Engineering Summer Conference. July 11-15, 2004.

Narayanan, Mysore (2004 c). *A Strategic Planning Process for Implementing and Improving Assessment*. Charlotte: North Carolina. Proceedings of **2004** ASME Heat Transfer/Fluids Engineering Summer Conference. July 11-15, 2004.

Narayanan, Mysore (2004 d). *Senior Design Project Report* submitted by Bryan Grody, Ming Han and Debbie Freeman. Hamilton, Ohio: Miami University Department of Engineering Technology.

Narayanan, Mysore. (2004 e). *Service-Learning and Engineering at Miami University*. 4th Annual International Conference on Service-Learning Research, Greenville, South Carolina. October 10–12, 2004.

Narayanan, Mysore (1994-2004). *Notes taken at the departmental minutes*. Oxford, Ohio and Hamilton, Ohio : Miami University, Department of Manufacturing Engineering and Department of Engineering Technology.

Seldin, P. (1991). *The teaching portfolio*. Bolton, MA: Anker.

Wiggins, G. (1990, June). *The truth may make you free, but the test may keep you imprisoned: Toward assessment worthy of the liberal arts*. Paper presented at the Fifth AAHE Conference on Assessment in Higher Education, Washington, DC.