METHODS OF ASSESSMENT BY SOURCES OF EVIDENCE[1]

The assessment process is designed to answer "what" and "how well" units are meeting their outcomes. Once expected outcomes have been established, the next step in the assessment process is to select the most appropriate assessment methods. Below are some sources of information that can be used in assessment activities. Many assessment professionals discuss "direct" vs "indirect" assessment methods. Assessment methods that are "direct" are those that judge student or client work, projects, portfolios developed as a result of their experiences. "Indirect" assessment uses students' or others' opinion to provide evidence about students' or clients' abilities.

Many times we worry about not having the perfect assessment method, but matching the correct assessment method to the outcome is more important than having a perfect, well-controlled assessment method! As stated by Tukey (1962): "Far better an approximate answer to the right question…than an exact answer to the wrong question…." (pp.13-14).

Student Learning Data

Information About Student Learning

- From course work, embedded, or authentic assessment (direct assessment methods)
  - Tests, including pre-post, entry, and exits
  - Graded homework
  - Ratings or rubrics judging quality of papers, reports, projects
  - Tests, rubrics on paper, projects from capstone course experience
  - Document analysis of paper, projects
  - Concept mapping or knowledge mapping
  - Expert's judgment of work
  - Criteria, rating, rubrics judging thesis, dissertation work
  - Qualifying exams for graduate work

- From longitudinal, cross-sectional, or cross-course comparisons including student portfolios (direct assessment methods)
  - Rubrics judging quality of work across time, sections, or courses
  - Comparison of best examples of student learning
  - Reflections by students about their learning

- From internships/coop experiences
  - Surveys completed by intern/coop advisors/faculty about student's abilities (direct assessment method)
  - Survey, interview, focus groups about satisfaction with student's performance (indirect assessment method)
  - Behavioral observation of skills

[1]Modified from Spurlin, J.E., Rajala, S.A., & Lavelle, J.P. (2008). Assessing student learning: Ensuring undergraduate students are learning what we want them to learn. In J. E. Spurlin, S.A. Rajala, and J.P Lavelle (eds). *Designing better engineering education through assessment: A practical resource for faculty and department chairs on using assessment and ABET criteria to improve student learning*. Stylus Publishing: Sterling, Va.

- From employers/potential employers
  - Surveys to employers about student's abilities (direct assessment methods)
  - Survey of those who interview for employment purposes about perceived students' abilities (indirect assessment method)
  - Survey, interview, focus groups about satisfaction with student's performance (indirect assessment method)
  - Behavioral observation of skills

- • From outside evaluations (direct assessment methods)
  - Experts judge overall major/program quality of students' abilities
  - Experts judge performance outside of course work
  - Behavioral observation of skills

- From self-evaluations
  - Self-evaluation of own skills

- From peer evaluations
  - Peer review of student work or skills through surveys or rubrics
  - Behavioral observation of skills

- From nationally-normed tests (direct assessment methods)
  - ETS Major Field Tests, Fundamentals of Engineering Exam (seniors)
  - SAT, GRE
  - Professional licenses requirements or exams

Information About Student's Satisfaction, Attitudes (Indirect Assessment Method)

- Surveys, interviews, or focus groups about satisfaction with learning environment, faculty, courses, curriculum, their learning and equipment/tools from prospective, current, graduating and withdrawn students and alumni

- Inventories about students' attitudes to monitor attitude changes over time

Information About Faculty's/Constituencies/Stakeholder Satisfaction (Indirect Assessment Method)

- Surveys, interviews, or focus groups about satisfaction with learning environment, students incoming ability, courses, curriculum, amount of student learning, equipment/tools

Other Data

Information About Potential Students/Participants

- Percentage of actually enrolled based on number of potential applicants, applications, acceptance and enrollees
- Number of visits to high school and community college counselors; number of visits from prospective students
- Feedback from high school and community college counselors, etc.
- Average/trends SAT, high school GPA
- Numbers in various groups (e.g., gender, ethnicity)

Information About Students/Participants

- Enrollment headcount
- Participation rates

- Retention trends
- Number of transfer credits
- Number/ratios of transfer students admitted to programs.
  - Comparison of baseline retention, academic performance, and graduation rate data for transfer versus first-time, entering, undergraduate students.
- Institutional, programs', and courses' gender and ethnicity numbers and ratios
- Membership in student professional organizations
- Specific studies conducted by institution's institutional research office
- Alumni job placement
- Graduate school acceptance rates
- Number of alumni honors/awards
- Average/trends SAT, GPA, course/workshop performance
- Demographics of various groups (e.g., gender, ethnicity)

Information About Constituencies/Stakeholders

- Number of faculty/student credit hours for each semester—by department, course, or instructor
- Number of full-time and part-time faculty—by rank, by headcount, ethnicity, and gender
- Student-faculty ratio
- Workload of faculty
- Salary ranges for faculty by specific ranks, gender, and ethnicity
- Specific studies conducted by institution's institutional research office
- Qualification of faculty/instructors
- Survey responses about students' view of faculty knowledge, preparation, skills

Information About Courses and Curriculum

- Transcript analysis or degree audit of courses students actually take
- Surveys about quality from students, alumni, and faculty
- Student development transcripts analysis (record of co-curricular experiences)
- Accreditors' or outside experts' judgment about quality of curriculum
- Specific studies conducted by institution's institutional research office
- Case studies

Information about Unit's Services

- Utilization of services
- Response time to queries, requests
- Surveys, interviews, or focus groups about satisfaction with unit's services, with clients, constituencies, stakeholders
- Case studies

Information About Physical Environment and Safety

- Surveys from users about quality
- Quantity of types of spaces
- Space utilization study
- Capacity statistics and studies
- Teaching-learning experts' observations using predetermined criteria
- Ratio of planned preventive maintenance to reactive maintenance
- Number of customer calls received by the unit (complaints, praise, areas of issues)

Number of crime incidents, crime rate, traffic citations, etc (annual tracking/comparisons)

Information About Equipment/Tools/Materials
- Users survey about access, usage, quality, condition, quantity
- Use of equipment, tools, software, books (annual tracking)
- Quantity by type and by learning space (i.e., classroom, labs)
- Number of customer calls received by the unit (complaints, praise, areas of issues)

Information About Technology Tools Related to Student Learning
- Surveys about access, usage, quality, attitudes (faculty, students, alumni)
- Specific software tools usage through the software: e.g., learning management systems may track amount of use of discussion boards or pages of content
- How technology was used (taxonomy of functional uses)
- Number of customer calls received by the unit (complaints, praise, areas of issues)
- Trends of costs (cost-benefit analyses)
- Expert and client opinions about impact on current policies, organizational structure

Information About Financial Resources
- Trends in sources and amounts of revenues,
- Average cost of instruction
- Total-costs of programs/curriculum/instruction,
- Level and composition of private/state/federal funding for research, teaching
- Audit statistics
- Fund-raising statistics

Benchmarking Information—Comparison to Other Institutions
- National surveys (e.g., ETS, National Survey of Student Engagement)
- Published studies from national sources (e.g., *US News & World Report*, Association of Research Libraries, American Association of University Professors)
- Specific studies conducted by institution's institutional research office

Those Who Can Provide Feedback:

- Prospective students
- StudentsTrustees
- Clients
- Parents
- Faculty (both full-time and part-time)
- Staff
- Employers of students/graduates
- Internship or coop supervisors
- Community related groups
- Industry that units' serve
- Trustees
- Alumni
- People of the state, region that units' serve
- Withdrawn students
- Other institutions
- Accrediting or licensing agencies

Pros and Cons of Assessment Methods on Student Learning

Example Assessment Methods on Student Learning	Pros of Method	Cons of Method
• From course work (embedded, course-based) (direct assessment methods)	• In general, students take embedded course work seriously; therefore work has a good chance of reflecting actual abilities. • Reflects program or department's course and curriculum, and program outcomes.	• In general, biases of the data over years, instructor or departmental differences can influence the results. • Reluctance of faculty to share results with entire faculty membership.
• Tests, including pre-post, entry and exits	• Inexpensive • Comprehensive • Pre-post testing allows for "value added" assessment	• Developing appropriate test questions that reflect learning outcomes and complex levels of learning takes time and skill. • For pre-post testing: difficult to design tests that are comparable at different times.
• Graded Homework	• Reflects students' ability when they have access to resources	• Does not assess students' ability or overall learning as typically defined.
• Ratings or Rubrics judging quality of papers, reports, projects,	• Can be used by others besides instructor, to assess quality	• Developing accurate rubric dimensions that reflect learning outcomes and levels of learning takes time and skill
• Tests, rubrics on paper, projects from capstone course experience	• Allows for assessment of higher cognitive abilities such as synthesis and evaluation of knowledge • Can assess in-depth knowledge • Allows creativity • Assessment of integration of learning	• Labor intensive for both faculty and students • Because course and project are high-stakes, it may produce student anxiety that may result in assessment reflecting lesser ability than actual ability.
• Concept mapping or knowledge mapping	• Unique technique to understand connections of concepts within students knowledge-base • Assessment of complex relationships	• Difficult to compare across students • Difficult to obtain objective judgment on abilities
• Expert's judgment of performance (e.g., art, drama, healthcare)	• Improves face validity of assessment activities	• Obtaining appropriate experts' time

Example Assessment Methods on Student Learning	Pros of Method	Cons of Method
• Criteria, rating, rubrics judging thesis, dissertation work	• Allows for judgment about overall graduate program across several students	• Difficult to define rubric dimensions that relate to multiple thesis or dissertations
• Qualifying exams for graduate work	• Developing exam questions across several graduates allow for better assessment of the graduate program.	• Oral presentations may be a challenge for those with language difficulties • Difficult to define questions that relate to several students
• From longitudinal, cross-sectional or cross-course comparisons including student portfolios (direct assessment methods)	• In general, shows longitudinal trends with rich detail • Assessment becomes an integral part of students' learning process	• In general, validity depends on how work is collected • Can overload assessment committees with too much information
• Rubrics judging quality of work across time, sections or courses	• Highlights' students' strengths and weaknesses in comprehensive manner	• Developing accurate rubric dimension that reflect learning outcomes and levels of learning takes time and skill • Content may vary widely by students
• Comparison of best examples of student learning	• Students do the work of providing the assessment "data" by supplying their best examples	• Student's judgment of "best examples" may not actually reflect faculty's judgment of "best examples"
• Reflections by students about their learning	• Provides opportunity for students to synthesis own work; • Identifies strengths and weaknesses	• Difficult to judge objectively
• From internships/coop experiences	• Supervisors typically provide feedback to students anyway	• Ratings and criteria of supervisor may not reflect program outcomes
• Surveys completed by intern/coop advisors/faculty about student's abilities (direct assessment method)	• Based on actual work experience that may reflect future career	• May obtain information only on a small number of outcomes • Limited observation time

Example Assessment Methods on Student Learning	Pros of Method	Cons of Method
• Survey, interview, focus groups about satisfaction with student's performance (indirect assessment method)	• Provides information about other outcomes besides competencies such as attitude	• Satisfaction with performance may not be reflective of student's ability
• From employers/potential employers	• In general, improves face validity of assessment activities	• Difficult to identify where alumni are employed • Sensitive information for both employer and program/department
• Surveys to employers about student's abilities (direct assessment methods)	• Provide information about student's abilities needed by employers	• Difficult to get direct supervisors to respond to surveys
• Survey of those who interview for employment purposes about perceived students' abilities	• Best person to compare quality of one institution's graduates to other institutions' graduates	• May only be able to assess a small number of general outcomes such as communication skills
• From outside evaluations Experts judge overall major/program quality of students' abilities (direct assessment methods)	• Improves face validity of assessment activities	• Obtaining appropriate experts' time
• From nationally-normed tests (direct assessment methods)	• Ability to compare from year to year or to other groups • National standard can be used for program's performance criteria • Convenient • Well developed test • Nationally or commercial surveys have reliability and validity information	• May not reflect program or institution's curriculum or outcomes • Limited faculty ownership • Costly to institution or student
• Information about student's satisfaction, attitudes (indirect assessment method)	• Important to hear from student's viewpoint • Conduct comparison of different groups of students on same outcomes/questions	• In general, students' perception of their ability may not relate to their actual ability • In general, alumni are more satisfied than graduating seniors who tend to be more satisfied than sophomores, etc.

Example Assessment Methods on Student Learning	Pros of Method	Cons of Method
• Surveys about satisfaction with learning environment, faculty, courses, curriculum, their learning, equipment/tools from prospective, current, graduating, withdrawn students and alumni	• Easy to administer • Low cost • Nationally or commercial surveys have reliability and validity information	• Usefulness is based on good design of survey questions
• Interviews or focus groups about satisfaction with learning environment, faculty, courses, curriculum, their learning, equipment/tools from prospective, current, graduating, withdrawn students and alumni	• Can provide rich data, personal perspectives; can go into depth about a particular aspect or factor • Other factors may arise that relate to academics such as pedagogy, class size, etc. which not expected or asked about.	• Those who participate tend to have either very positive or very negative opinions which is a selection bias • Fear of retributions may bias respondents' answers
• Inventories about students' attitudes; monitor attitude changes over time	• Commercially available instruments provide reliability and validity information	• Usefulness depends on how related to program outcomes.
• Information about Faculty's satisfaction (indirect assessment method) through survey, interviews or focus groups	• Important to hear from faculty's view • Factors may arise that relate to academics such as pedagogy, class size, etc.	• Usefulness is based on good design of questions