

**EDUCAUSE** Center for Applied Research

**Research Bulletin**

**Volume 2002, Issue 21**

**October 29, 2002**

# **Technology Assessment: Making Sure We Get It Right**

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## Overview

Despite a foundation in critical inquiry, higher education has yet to fully embrace assessment. The reasons range from a lack of understanding of the purpose, process, and value of assessment to the perceived threat that information might be used against us. Others dismiss assessment because it consumes resources. Avoiding assessment, for whatever reason, exposes us to the risk of making poor or uninformed decisions because we lack information. In an environment of constrained resources and institutional accountability, this is an avoidable risk.

The purpose of assessment, simply put, is to help us improve what we do. Understanding the roots of key words clarifies the point. Assessment comes from *assidere*, meaning to sit beside. When someone sits beside us, that person provides additional perspective as a partner in order to assist us. Contrast this with the term evaluation, which comes from *valere*, meaning to assign value and judge. If someone assigns value, they can rank our work, prioritize it, and pass judgment on it. While it can be useful to have an external judgment, judgment often is not aimed at helping us improve our work. A third word that has recently entered this arena is accountability, which comes from *acompter*, meaning to count. If we are accountable, we must be able to justify our work to another person, which implies not only a responsibility to another person but to a person who has some degree of authority over us. In both evaluation and accountability, we are far less inclined to expose our shortcomings because of the risk involved. Assessment assumes that people in the organization share a common mission and are working, albeit independently and in different areas of expertise, toward achieving the mission. Thus, developing a cycle of assessment and improvement eliminates the threat or risk attendant in evaluation and accountability.

Assessment is a critical tool for decision makers. Consider the types of questions that presidents, provosts, CIOs, deans, department chairs, and individual faculty members must address:

- Is the quality high enough?
- Does the investment make a difference?
- Where should we commit resources to be most beneficial?
- Is this program successful or viable?
- How are our resources being used?
- What are the best strategies to improve student learning?
- How do we compare to others?

A practical way to think of assessment is as an aid to answering these questions.

Assessment is necessary for institutional improvement because it provides the basis for answering internal and external questions, such as those dealing with accreditation, use

of technology, cost efficiencies, or enrollment dilemmas. Becoming an organization that reviews itself at all levels and makes decisions based on factual, relevant information fosters effectiveness and efficiency. A proactive stance on assessment may also help institutions avoid the negative repercussions of accountability.

To develop a useful assessment program on campus, assessment must be seen as an activity that derives from the purest sense of the word. Its primary purpose is to provide perspective on our work in order to help us improve. Recognizing that we stand to gain from assessment—and without it we stand to lose—higher education is beginning to commit itself to assessment.

This Research Bulletin underscores the need for internal, critical assessment efforts on campuses by describing the purpose and value of assessment in higher education. It describes the current state of assessment as it relates to information technology (IT), including a number of examples. Finally, it suggests how campuses might carry out assessment.

## Highlights of Assessment

Assessment is vital to making informed decisions, particularly in times of change. Because of the changes brought about by information technology, interest in assessment is on the rise. In the mid-1980s, several national reports (the National Institute of Education's *Involvement in Learning: Realizing the Potential of American Higher Education* and the report from the Association of American Colleges and Universities titled *Integrity in the College Curriculum*) criticized college assessment activities, leading to a movement to examine and restructure the ways student progress was measured. At the same time, higher education saw a shift toward accountability and outcomes assessment.<sup>1</sup> These changes coincided with the emergence of the Information Age: as colleges and universities were developing assessment practices, technology edged its way into higher education.

Today, when educators are pressured to justify methods and results, IT is a double-edged sword. It is both a solution to certain problems and a source of others. Measuring the potential of IT and the degree to which we are realizing it, and determining the cost we are willing to bear, are all assessment questions.

Technology assessment involves three common assessment challenges.

**Nonstandard Solutions.** Colleges and universities have taken a number of different approaches to the use of technology. The way technology is used from one institution to the next makes it difficult to measure its use and cost and whether technology is making a difference on a systemic level. The variation also leads to difficulty in determining exactly which uses of technology—and under what circumstances—make a significant difference. The studies conducted are primarily anecdotal. Because of the nonstandard nature of technology and our inability to draw broad conclusions, the integration of technology has met with intense skepticism.

**Bundled Questions.** Technology skeptics and supporters alike have tried to demonstrate direct, quantifiable results to the equation  $a + b = c$ , where  $a$  is teaching,  $b$  is technology, and  $c$  is a cost-effective change in student learning outcomes. At the surface this seems appropriate and logical; however, the simplicity is deceptive. For example, the way in which the technology is used and the students' access to technology disallows the blanket use of the variable "technology." The variable "teaching" is equally broad and complex. As a result, measuring whether technology improves the educational process is complex. Only recently have we begun to understand the problematic nature of this simplistic, outcome-oriented question.<sup>2</sup>

**Unclear or Obsolescent Definitions of Success.** Technology assessment hinges on measurement. It is impossible to develop an assessment, either quantitative or qualitative, without identifying what is to be measured. In order to do so, one must identify critical indicators of success. Traditional outcome measures for students of higher education (retention, graduation, graduate school placement, alumni engagement), faculty success (rank, tenure), or institutional success (grant dollars, size of endowment) may not be appropriate for technology, particularly when seeking to promote innovation, increase institutional capacity, or develop new competencies. It is crucial that we look for metrics that provide better information than we currently have.

### Who Is Responsible for Assessment?

An effective assessment effort is collective and becomes part of a campus culture. Assessment requires people in all areas of an organization to be involved in collecting, communicating, and reviewing information. While there might be one person or a small group of people designated to lead it, assessment is something that becomes part of each person's work. One example is a campus decision to require students to own laptop computers. A quick reaction might be to place the onus of assessing the impact of the laptop program on the campus technology unit. However, within the context of broad questions to which the institution might want answers, sound decisions clearly depend on a culture of assessment. This example raises several relevant questions, which must be answered by different units.

- What strategies are needed to ensure successful student services in the mobile computing environment?
- What is the impact of laptop computers on teaching and learning outcomes?
- Are our administrative structures and processes effective in a mobile computing environment?
- What is the return on investment for a mobile computing environment?
- Will this program increase alumni giving?
- How will this program affect enrollment?

A sound assessment strategy will answer the questions "Who is the best person to answer that question?" and "Who routinely gathers and holds that information?"

## When Does Assessment Occur?

Assessment efforts of quality must involve gathering information during three discrete times: before, during, and after the activity or technology is introduced (see Table 1 below). For example, to determine the value of a simulation program for population dynamics in an ecology class, one would need (1) information on the facility with which the students and faculty could use the program prior to its introduction, as well as their knowledge level of population dynamics; (2) data on how the program was working during the assignment time; and (3) indicators of how much information the student learned as a result.

### Needs Assessment

Needs assessment typically occurs at the beginning of a process. Usually diagnostic, it is used to gather information to ensure that all of the required pieces are in place to start an activity. For example, a technology training unit might conduct a needs assessment to determine the current skill levels of faculty, students, and staff in order to develop programs for information literacy.

### Formative Assessment

Formative assessment occurs while an activity is in process in order to improve it. If you are gathering information to modify a process as it is occurring, you are conducting formative assessment. A help desk might routinely check call frequencies and times during the semester to assess whether its hours and staffing are appropriate. A faculty member hoping to make improvements to teaching might review a discussion database to determine if the students grasped the main point of the lesson.

### Summative Assessment

Summative assessment is the last of the three stages of assessment but is often the only one used. An example is a principal investigator providing an overall report on a project at the end of a grant. A faculty member reviewing a discussion database in order to assign student grades is another instance of summative assessment. The grade is a quantification to provide students with feedback for self-improvement. However, because we place value on the grade itself, it is also an evaluation.

**Table 1. Three Types of Assessment**

Assessment Type	Assessment Timing	Assessment Purpose
Needs	Before	Diagnose, plan, benchmark
Formative	During	Improve, adjust, respond/react
Summative	After	Evaluate, decide, prioritize

For information to be truly valuable, it should include needs, formative, and summative assessment. The assessment movement is changing the culture of summative-only assessment because collecting input only at the end of a process limits information collection and decision making. Funding, program continuation, and student placement decisions often are made as a result of summative assessment. By assigning value and setting priorities based only on end-of-program quantitative results, we limit our perspective and create systems of limited use.

## Where to Begin

Making informed decisions about technology in higher education is imperative, as is defining the assessment questions that are important, both individually and systemically. With an overwhelming number of assessment possibilities, it is important to identify a few targets on which to concentrate. There are three main perspectives a campus should consider in developing an assessment strategy: the individual, the campus, and higher education. The individual perspective is defined by one person, perhaps a faculty member or an administrator, and it is used to make adjustments in that person's own work. The campus perspective is broader—assessment in this area is used to make improvements on a departmental or campus-wide scale. The higher education perspective is used for making decisions and setting priorities based on broad trends. Each segment represents only one piece of the puzzle, which is why a multi-tiered approach, with routine communication, is required to develop an understanding of the influence and impact of technology on education.

Next, useful assessment efforts address three main questions:

- What is the purpose of the activity being assessed? What, specifically, is gained by doing it?
- How do we know that the purpose of the activity is being met? What types of information demonstrate the outcomes of the activity, and where are they located?
- Once the information is gathered, what is done with the findings?

These questions help narrow the focus of assessment to a particular activity, determine the best way to assess the activity, and ensure that the results are used for improvement.

When assessing technology, three types of questions span the missions of most colleges and universities: questions about business processes, questions about research, and questions about teaching and learning. Table 2 (below) gives examples of questions that might be asked in each area, based on the three perspectives identified above. Table 3 (on page 9) identifies possible questions, and tools to answer those questions, for several measurable criteria in assessment programs.

**Table 2. Types of Questions for Assessing Technology**

	<b>Individual Perspective</b>	<b>Campus Perspective</b>	<b>Higher Education Perspective</b>
<b>Questions about Business Processes</b>	Can students conduct business remotely?	Are staffing changes required to implement and maintain online service offerings in a high-tech, high-touch environment?	Are trends emerging that indicate business processes facilitated through technology are more efficient?
<b>Questions about Research</b>	Can students in my course access more information for their research through technology?	Are faculty spending less time on routine research tasks due to technology tools?	Are new systems of online peer-reviewed journals impacting scholarship?
<b>Questions about Teaching and Learning</b>	Is presentation software an effective application of technology in my class?	Are students using technology to develop higher orders of thinking?	Are students in technology-enriched campus environments reporting more valuable educational experiences?

### Measuring Efficiency

Efficiency, or the quality of the process with which the desired outcome is produced, is routinely studied in many industries outside of higher education. Associations such as EDUCAUSE, the National Association of College and University Business Officers, and the Society for College and University Planning have collected examples of business practices redesigned for increased efficiency. For example, redesigning the travel reimbursement process from a manual process to one online reduces time and errors, with funds electronically deposited in the individual’s account.

### Measuring Use

Measuring use is important because the best-designed operation, when unused, has no redeeming value. Campuses can measure the use of services, collecting data on frequency, duration, and type of use. Numbers on when and how something is used can be combined with user demographic data or more detailed information, such as skill levels and proficiency of users, to yield additional insights. An example is the data indicating how many times a campus Web site is accessed. These data are often augmented with information on what users find valuable.

## Measuring Infrastructure and Application

Having something is not the same as using it effectively. An example is provided by measures of how wired a campus is. A number of colleges and universities have raced to purchase infrastructure. However, determining how technology is used yields a more direct link to its value. For example, a provost who has information about how the technology on campus is being applied is in a better position to answer questions about its effectiveness than a provost who knows only how much technology the campus has.

## Measuring Outcomes

Outcomes-based assessment measures the congruence between goals and outputs. Outcomes are helpful to ensure that programs and services are operating smoothly and effectively. For projects, outcomes can be used to determine the degree of success with which an initiative was deployed. The hallmark of an outcomes assessment is that clear, measurable goals are required. For example, the Pew Foundation has supported the study of redesigned large-enrollment classes. Indiana University–Purdue University Indianapolis (IUPUI) found that students in the redesigned course were significantly less likely (0.1 level) to receive a D or an F or to withdraw than students in sections of the course taught in traditional mode.<sup>3</sup>

## Measuring Effectiveness

Effectiveness, or being prepared or equipped for use, is routinely measured in many industries. For example, the pharmaceutical industry ensures that drugs are effective through multiple trials and rigorous testing prior to release. Higher education uses measures of effectiveness to foster a greater degree of control and understanding of where a campus is in a long-term, strategic process. An IT organization may measure the effectiveness of its help-desk operations, for example. Student affairs might evaluate the effectiveness of online student services.

## Measuring Value

Measuring value is, perhaps, the most difficult task. Value is not always direct; value can be assessed by focusing on missed opportunities. Value is defined not by the operational cost of equipment and staffing but in a growth model, where its use and intellectual capital become an asset. Rather than focusing on return on investment, some advocate that higher education adopt a value on investment model, where value is derived from fostering innovation, increasing institutional capacity, and developing new competencies.<sup>4</sup>

## Measuring Behaviors and Attitudes

Behaviors and attitudes can significantly affect initiatives, including those involving IT. Changes in behaviors are readily observable. Changes in attitudes are more difficult to measure because they rely on self-reported data. Even so, they provide information that can be vital to decision making. For example, the National Survey of Student Engagement assesses the extent to which undergraduates engage in sound educational practices, with the goal of helping institutions improve. In the 2002 report, 87 percent of

students indicated satisfaction with their college experience. However, transfer students perceived the campus environment as not supportive of their needs.<sup>5</sup>

## Benchmarks

Participating in assessment studies that gather data from technology programs on many campuses creates an opportunity to establish benchmarks. Benchmark data assist leaders in making decisions that best support the institution. For example, Hamilton College is collecting information to develop IT spending benchmarks that will help campuses evaluate their efforts.<sup>6</sup>

**Table 3. Questions and Tools for Measurable Criteria**

<b>What Do You Want to Assess?</b>	<b>Sample Questions</b>	<b>Tools</b>
Efficiency	Is the quality of an educational experience improved by using technology?	Nationally normed questionnaires
Use	How often are students using online registration rather than phone or walk-in registration?	Tabulation databases
Infrastructure/ applications	How are the faculty using technology in their teaching?	Focus groups, student–faculty surveys
Outcomes	Do graduating students demonstrate information literacy skills?	Performance tasks, portfolios
Effectiveness	Does the campus network provide fast, reliable Internet connectivity for students?	Interviews, surveys
Value	Are opportunities lost by not upgrading a campus phone system worth the cost to upgrade?	Surveys, environmental scans
Behaviors/attitudes	Does use of IT change a faculty member’s attitude about technology?	Before and after surveys, journals
Benchmarks	How do we compare to other colleges and universities like us?	Participation in national studies, surveys

## What It Means to Higher Education

There are a growing number of well-recognized assessment efforts in higher education, including

- Kuh and Hu<sup>7</sup> have correlated the national survey of College Student Experience Questionnaire to campus responses to the Yahoo! Internet Life's Most Wired Campus survey.
- The Academic Computing Assessment Data Repository was developed at Seton Hall University in response to requests from the Ubiquitous Computing Pioneer campuses in 1999. Colleges and universities can use normed tools and instruments to store, label, and index digitized quantitative and qualitative assessment data for individual studies and trend analysis through a Web-enabled interface.
- The Flashlight Program, part of the Teaching, Learning, and Technology Group and an affiliate of the American Association for Higher Education, provides survey instruments and resources to campuses, with the metaphor of shedding light on the right assessment questions.
- The Campus Computing Project, run by Kenneth C. Green, conducts a computing survey annually and compiles results on college and university computer practices.

There are two keys to understanding the impact of technology on higher education. The first is balancing the forest and the trees by “zooming in” to gather, analyze, and read information that is highly specific to narrowly defined questions, and then by “panning out” to review the data in context with other studies to develop an understanding of trends.

The second key to technology assessment is redefining our performance indicators. Technologists often seek to create rich, searchable enterprise systems that store and parse data, pushing it to end users, enabling them to make more informed decisions. In doing so, we ask them to become a part of a team to rethink processes and potential uses of information and data. This is precisely what higher education needs to do in technology assessment. We must determine what purposes we have for technology and develop criteria by which it can be measured. This requires collective input from the many facets of a campus.

Decision makers can now look to a growing number of colleges and universities that routinely implement assessment practices. Today, individual faculty research, programmatic assessment, and national studies provide us with examples of applied assessment. Exploring other campus assessment activities may guide our own activities and give us insight into where higher education may find the most value in technology. Table 4 (below) offers some examples of such activities.

**Table 4. Examples of Sample Assessment Questions**

Assessment Question	Example
Is the quality good enough?	Tufts University <a href="http://studentservices.tufts.edu/about.htm">http://studentservices.tufts.edu/about.htm</a>
Does the investment make a difference?	Washington State University <a href="http://www.cltl.wsu.edu/research.asp">http://www.cltl.wsu.edu/research.asp</a>
Where should resources be committed to be most beneficial?	Seton Hall University <a href="http://titc.shu.edu/initiatives/assessment/index.html">http://titc.shu.edu/initiatives/assessment/index.html</a>
Is this program successful or viable?	University of South Dakota <a href="http://www.usd.edu/library/assessment_gateway/">http://www.usd.edu/library/assessment_gateway/</a>
How is what we have currently being used?	University of Michigan <a href="http://sitemaker.umich.edu/carat/">http://sitemaker.umich.edu/carat/</a>
Do we invest?	National Survey of Student Engagement <a href="http://www.indiana.edu/~nsse/html/research.shtml">http://www.indiana.edu/~nsse/html/research.shtml</a>
What strategies are best to improve student learning?	Flashlight Program <a href="http://www.tltgroup.org/programs/flashlight.html">http://www.tltgroup.org/programs/flashlight.html</a>
How do we compare to others?	Campus Computing Project <a href="http://www.campuscomputing.net/">http://www.campuscomputing.net/</a>

Regardless of whether the question is why to fund technology or why to cut funding for technology, the answer is not easy. To provide well-documented, reliable answers, campuses should consider several actions.

- Become part of national or international initiatives to contribute and to learn what is occurring on a wide scale. Many campuses have already conducted surveys, held focus groups, and gathered information.
- Support research, documentation, and communication of individual deep studies on specific uses of technology for narrowly defined purposes.
- Engage in a national and local discussion of the institutional worth of technology to recast the definition of measuring value.
- When conducting in-house assessments, use the following guidelines:
  - Be iterative.
  - Gather data using multiple methods.
  - Ask specific questions.

- Involve cross-functional constituencies.
- Make participation safe; punitive evaluation stifles innovation and honesty.
- Consult regional and national accreditation guidelines, and work in concert with other campus assessment efforts.
- Start now; do not wait for initiatives to start before collecting data.
- Communicate results quickly and widely on campus.
- Gather information at the beginning, middle, and end of programs and projects.
- Measure for efficiency, effectiveness, and value.
- Value the process of improvement, not just the outcome.

## Key Questions to Ask

As colleges and universities determine how they will approach assessment, there are some key questions to ask.

- Is assessment routinely practiced on campus?
- Do we confuse assessment with evaluation and accountability?
- Is assessment practiced at the beginning, middle, and end of programs?
- Do we have the appropriate culture and set of tools for assessment to succeed?
- Are we making the best informed decisions possible, or would assessment help?

## Where to Learn More

- ERIC Assessment and Evaluation Resources, <<http://ericae.net/>>
- U.S. Census Bureau Computer Use and Ownership Data, <<http://www.census.gov/population/www/socdemo/computer.html>>
- Gateway to Internet Resources on Higher Education Outcomes Assessment at North Carolina State University <<http://www2.acs.ncsu.edu/UPA/assmt/resource.htm>>
- Outcomes Assessment in Higher Education at Texas A&M University, <<http://www.tamu.edu/marshome/assess/oabooks.html>>
- AAHE Assessment Forum, <<http://www.aahe.org/assessment/>>

## Endnotes

1. A. W. Astin, *Assessment for Excellence: The Philosophy and Practice of Assessment and Evaluation in Higher Education* (Phoenix, Ariz.: Oryx Press, 1993).
2. H. Stewart, *The Influence of Information Technology on the Student Perception of the Student–Faculty Relationship*, unpublished doctoral dissertation, Seton Hall University.
3. See “IUPUI Impact on Students,” <<http://www.center.rpi.edu/PewGrant/rd1award/iupuiFR1.html>>.
4. K. Harris, M. Grey, and C. Rozwell, *Changing the View of RIO to VOI—Value on Investment* (GartnerGroup SPA-14-7250, November 14, 2001).
5. National Survey of Student Engagement, <<http://www.indiana.edu/~nsse>>.
6. D. Smallen and K. Leach, “Seven Benchmarks for Information Technology Investment,” *EDUCAUSE Quarterly*, 25 (3), pp. 22–27.
7. G. Kuh and S. Hu, “Computing Experience and Good Practices in Undergraduate Education: Does the Degree of Campus Wiredness Matter?” Paper presented at the annual meeting of the American Educational Research Association, Seattle, Wash., 2001.

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