XI

OUTCOMES ASSESSMENT

Introduction

Outcomes assessment seeks to determine the degree to which an institution is achieving its stated mission, goals and objectives. It is a process of collecting and analyzing evidence of congruence between what an institution says it does and the actual outcomes of its programs and activities. NJIT's mission statement identifies the special combination of characteristics that distinguishes the university. Consistent with that mission, goals and objectives from across the university are articulated in NJIT's annual budget request to the State, which is an extensive accountability document, as well as in various institutional planning documents.

Eight critical elements are included in the mission statement. By examining the outcomes-related information available at NJIT, it is possible to assess institutional effectiveness with respect to these mission elements and to identify areas in need of additional assessment. Table 11.1 presents a summary of the links between the key elements of the mission statement and related outcomes activities. Evidence of NJIT's success as a comprehensive technological university, for example, would include the self-assessments required by professional accrediting boards, reports for the statewide College Outcomes Evaluation Project, common examinations and capstone courses, professional entry examinations, locally developed assessment measures and the career patterns of NJIT graduates.

Assessment occurs at several different levels at NJIT. There are locally developed assessment activities, those in response to statewide outcomes evaluation efforts, and those required for nationally-based assessment activities. Academic assessment takes place at all three levels: locally, through the administration of standardized tests and common curricula and examinations; State-based programs, such as the 1989-1990 test of general intellectual skills; and nationally-based activities, such as the self-studies required for various accrediting bodies. While the information derived from each of these activities is used for purposes of program improvement, there needs to be more carefully defined and developed linkages among them. The absence of interrelationships, however, appears to be characteristic of assessment activities generally. The assessment movement is still relatively new, its origins have been somewhat diffuse, and there is insufficient articulation between and among the many efforts.

At NJIT, what and how well our students learn are the critical questions to which many of the university's outcomes efforts are directed. The most recent and planned assessment initiatives are testimony to NJIT's continuing effort to answer these questions as fully as possible within the context of the university's unique mission.

Locally Developed Outcomes Activities

As part of the annual budget process, the Office of Academic Affairs requires all colleges to develop goals and objectives for the next fiscal year. These must be consistent with the university mission and are included in the materials prepared for internal budget review. The annual performance evaluations of the deans address their success in meeting the goals and objectives set the previous year. This process is also followed by all other offices and divisions reporting to Academic Affairs.

At the course level, several mechanisms academic outcomes is the professional licensure

Table 11.1

Mission Elements and Related Outcomes Activities

Serves as a comprehensive technological university
- ABET/NAAB/CSAB/AACSB
- EIT
- COEP
- Departmental assessment process
- Industrial advisory boards
- Alumni surveys
- Locally developed outcomes assessment
- Co-op education evaluation activities
- Grant evaluation requirements (e.g., federal Co-op grants)

Anticipates and responds to change
- Development of new programs-needs based
- Annual Research Summary
- Industrial advisory boards

Educates broadly a wide range of students
- EOP data
- New Jersey College Basic Skills Placement Test
- Enrollment/ retention data
- Graduation data
- Local placement tests and post-tests
- Project CAP data

Educates students to achieve their full human potential
- COEP/GIS
- Locally developed outcomes assessment
- Study of student assessment
- Student Services evaluation data
- Review Committee on Department and Program Assessment
- Grant evaluation requirements
- Alumni surveys
- Local placement tests and post-tests

Prepares graduates for entry into a profession
- Alumni surveys
- Capstone courses
- Co-operative education evaluation data
- Architecture studios

Seeks to expand knowledge through research and scholarly activities with strong applications orientation
- Annual Research Summary

Serves as a public institution closely linked to the State's economy
- Service activities (Public Service Task Force Report)
- Annual Budget Document
- COEP
- Reports of NJIT Service Corps
- Alumni surveys
- Annual Research Summary
- Patent activities
- Technology transfer

Serves as an urban institution
- Pre-college data
- Public service activities (Task Force Report)
- COEP
- EOP data
- Reports of NJIT Service Corps

are employed to assess academic achievement. Since 1986, common curricula and examinations have been required in foundation and first professional courses. Curricular improvements, such as a recent restucturing of the freshman physics course, have resulted from these assessment activities.

In architecture, the focus is on the design studio which is at the core of an architect's education. It is viewed as that part of the students' education which integrates what they have learned and best prepares them to find employment and make a positive contribution to the profession. Students are continuously

evaluated in their studio projects according to various formal and informal processes, including critiques by faculty not teaching the studio, as well as by practicing architects external to the university. This external review process provides assessment of a student's work independent of the grading process. The School of Architecture is currently in the process of modifying studio approaches to better prepare students for the profession.

Three additional local initiatives were introduced in 1990-1991. The first is a faculty-developed engineering fundamentals test designed to improve student performance on the national Engineer in Training (EIT) test. It was administered in the senior design course on a pilot basis in the Spring 1991 semester, with test performance used in part to determine final course grades. Results are being analyzed by subject area for the purpose of curricular and test improvement; a second administration of the test is planned for Spring 1992.

The second is a fully articulated approach developed by two academic departments: Chemical Engineering, Chemistry and Environmental Science, and Humanities. It is an interdisciplinary venture involving faculty from these departments and the program in Science, Technology and Society. Faculty work collaboratively to plan the curriculum and team-teach courses involved. The approach is structured according to two assumptions: assessment of educational outcomes may be undertaken within the context of a discipline, and the goals of chemical engineering and those of general education are complementary. It seeks to link communications and critical thinking skills with work in the major field. Assessment takes place in two stages, the rising sophomore assessment and the capstone assessment. Research evaluation of the program is ongoing, but preliminary results indicate that a student's ability to write successfully about chemical engineering may serve as a predictor of that student's ability to perform successfully in the chemical engineering curriculum.

In the third effort, faculty have developed an outcomes program in a technical writing course that provides accountability for both the Humanities and Engineering Technology Departments, which requires the course of its majors. Students are required to write a proposal to a specified audience regarding a technical innovation, as well as to submit selections of their best work. Faculty meet to team score the student efforts according to established criteria. Preliminary findings indicate that the assessment provides useful feedback to the faculty who teach the course, particularly because the approach is research-based. A similar program of assessment is planned in the School of Industrial Management. It will occur in a writing course required of all majors and will be modeled after the program in technical writing.

Other internal assessment data include university maintained files on grade point calculations and transcripts, resulting in a fifteen-year history of grade distributions. This tracking of student academic records reveals that there has been consistent and fair application of grading policies and practices, and no grade inflation. That is to say, the GPA by percentile has remained essentially unchanged.

Additional mechanisms for assessing outcomes include the standardized tests administered to incoming freshmen by the Counseling Center in order to place students in appropriate level courses and the post-tests administered as follow-up to this process. The pre-tests include the New Jersey College Basic Skills Placement Test (described below), the Toledo Chemistry Test and the locally developed Mathematics Placement Test. Responses to the annual basic skills questionnaire identify the number and percentage of students needing remediation. Performance in first semester courses is also analyzed in relation to placement test scores.

The data are then used to revise curricula and/or placement criteria. For example, the beginning math sequence was recently revised to address more effectively the diverse preparation levels of students requiring the pre-calculus coursework. Post-testing of the students in English and mathematics remediation are also used to assess the impact of the programs, as well

as to assist in subsequent placement decisions. The Remedial Program Effectiveness Report prepared annually for the New Jersey Department of Higher Education describes and assesses the university's remedial and developmental programs on a continuing basis. (See Appendix 5)

Tracking of individual student grades is designed to identify problems, provide support where necessary and minimize student attrition. This individualized approach to the uses of outcomes data is exemplified by the early intervention system described in the chapter on undergraduate instruction. While the program is too new to evaluate, reports from faculty are positive. Data collection and analysis procedures have been developed through the Office of Institutional Research to track the system.

Extensive data are also collected by the Office of Institutional Research in response to State and federal reporting requirements, as well as to internally identified information needs. Numerous surveys are also conducted by Institutional Research in conjunction with other institutional offices. Surveys are administered in the freshman year (ACE Student Information Form, NCHEMS Entering Student Questionnaire and locally developed questions), shortly after graduation (NCHEMS plus locally developed questions), and then five and ten years after graduation. Previously, the last two were NCHEMS surveys administered in alternate years. These are now being locally developed, using many of the previous questions; both will be administered annually.

The data are maintained by the Office of Institutional Research in a comprehensive system that allows for prompt and complete answers to all relevant questions. Much of the key data are summarized annually in a widely distributed internal document, 40 Most Commonly Asked Questions About NJIT. (See Appendix 9) A summary of the results of the ACE Student Information Form for the 1990 freshman class provides valuable information, such as economic and ethnic differences by sex. Other data, such as the results of the alumni surveys, might also be summarized and disseminated more widely for purposes of decision-making and institutional improvement.

Data collection and analysis with respect to student retention are particularly noteworthy. Cohort data have been collected by race and student status (regularly admitted, conditionally admitted and EOP) for all full-time entering freshmen since September 1982. These data are reported annually to the State in NJIT's annual budget submission and analyzed internally to identify trends and develop strategies for improved retention. (See Appendix 6)

Various other NJIT offices also maintain extensive data bases on outcomes. The Office of Career Planning and Placement, for example, collects information on co-operative education students from employer surveys, employer evaluation forms and on-site visitation reports. The Counseling Center collects data on student evaluations of the services it offers and on student contacts with the center in order to be more responsive to student needs. Data are also collected on the impact of NJIT's research and public service activities. Since 1986, the Office of Academic Affairs has published a document entitled "Funded Research and Publications and Presentations", based upon the results of an annual survey of faculty. A similar document on public service activities is planned by the new Office of Public and Community Service.

For some time, a database on the impact of NJIT's pre-college programs has also been maintained. High school students participating in programs of a few weeks or more are tracked to determine their college-going rate, college majors and career choices. Plans now call for the expansion of this database to include elementary and middle school students, for the purpose of identifying continued interest in mathematics and science.

Statewide Outcomes Evaluation

Since 1978, NJIT has administered the New Jersey College Basic Skills Placement Test (NJCBSPT) to all incoming freshmen as mandated by the State Board of Higher Education. The test seeks to measure student

proficiencies in verbal skills, computational skills and elementary algebra. Together with the locally developed tests listed above, the NJCBSPT is used to place freshmen in appropriate level foundation courses and periodically to assess, and if necessary revise, the developmental and remedial programs offered.

NJIT also reviewed academic and other programs as part of the statewide College Outcomes Evaluation Program (COEP). Beginning in 1987, this initiative required all public colleges and universities in New Jersey to assess their performance in general education and each major, as well as their impact on the community. Owing to the State's fiscal crisis, COEP was discontinued in the Summer of 1991. NJIT's internal assessment activities will continue, of course, and the Outcomes Assessment Steering Committee established to oversee the COEP effort will serve as a standing committee of the university. It will review, coordinate and initiate, as appropriate, an array of university assessment activities.

In addition to the program assessment process, the COEP project produced a test of General Intellectual Skills (GIS) which each institution was required to administer to a sample of sophomore students. NJIT assisted in piloting the GIS the first year and participated fully in its administration the next two years. The data would seem to indicate significant improvement in the test results for NJIT students in the second year. These data will be further analyzed for purposes of program improvement, as appropriate.

Nationally Based Assessment Activities

Reviews by professional boards have also resulted in NJIT's undertaking intensive self-evaluations. The university is accredited by the Accreditation Board for Engineering and Technology (ABET), the National Architectural Accrediting Board (NAAB) and the Computer Science Accreditation Board. Because the School of Industrial Management was established relatively recently, it is in the initial stages of seeking accreditation from the American Association for Collegiate Schools of Business (AACSB).

Another nationally developed measure of academic outcomes is the professional licensure examination. The Engineer in Training (EIT) examination is the first step in the process of becoming a licensed Professional Engineer. NJIT students are encouraged to take the EIT test at the completion of their baccalaureate degree requirements, but given the fact that licensure is not required of all practicing engineers, only a small number of seniors take the test. There has been particular emphasis on the EIT in the past several years in order to increase the number of test takers at NJIT, as well as to improve general performance.

Conclusions

A one-year study of student assessment at NJIT was recently completed. It identifies a list of outcomes consistent with NJIT's goals for general education and existing assessment tools. It then suggests additional assessment strategies to ensure that the outcomes are evaluated more fully. Included are new questions for the surveys of NJIT alumni and a requirement that upper division students take a standardized test such as the GRE or GMAT and/or participate in one or two capstone courses.

That NJIT takes its mission very seriously is evident in the many outcomes-related activities designed to assess success in achieving our goals. More remains to be done, however. Not all of the data collected are used to the best advantage, owing to insufficient analysis and limited dissemination. Summary analyses of the most critical data and systematic distribution to all appropriate departments, divisions and offices should be undertaken. Next, because the locally developed programs of outcomes assessment have proven effective, they should be piloted in one or two additional departments. Based on the research findings, consideration would then be given to the long-term goal of instituting the approach universitywide. Finally, the recommendations of the student assessment report should be implemented as appropriate.