

3. UNDERGRADUATE EDUCATION

THE NATIONAL CONTEXT

The decade of the 1990s has highlighted a number of issues for undergraduate education on a national level and at Rutgers. The quality of teaching, the content of the curriculum, and the cost of education in relation to its outcomes have become significant issues among a variety of higher education constituencies. The general public, the business community, and state and federal government officials have become increasingly concerned that undergraduates are experiencing quality in their education, that the resources of higher education institutions are efficiently utilized to support undergraduate education, and that the undergraduate education experience prepares students for success in their future lives. Accountability and outcomes assessment have increased in importance in response to the need to demonstrate the efficiency of higher education institutions and the effectiveness of undergraduate education programs in the development of individuals who can contribute successfully in our society in a variety of roles. At the same time, state financial support for higher education has been limited and has made garnering resources for efforts to improve undergraduate education difficult.

The quality of teaching at research universities has been of special concern to the public. Commitment to the teaching role of faculty members and the adequacy of teaching resources allocated for undergraduate programs are at issue at these institutions. In response, many institutions, including Rutgers, have taken action to reaffirm their commitment to and support for high-quality teaching for undergraduates. Faculty development resources have been designated to support the teaching role of faculty members. In addition, it has been recognized that institutional reward structures must be adjusted to acknowledge the importance of undergraduate education.

Methods of teaching and the content of the curriculum have undergone scrutiny in order to ensure that students are prepared to function successfully in the workplace, to participate effectively in civic life, and to support the future development of society's intellectual and cultural institutions. In this respect, universities have had to grapple with the question of what it will mean to be an educated person in the 21st century. A number of societal changes have structured and influenced the nature of this discussion.

In terms of demographics, the United States has experienced substantial growth in the diversity of people and cultures in its population. Similarly, the populations of universities have become increasingly diverse, partially as a result of the changes in national and state demographics, and partially as a result of increasing concern with the issue of access for all racial and cultural groups. This has led to identification of a number of teaching and curriculum needs. Faculty members need to find effective ways of teaching a diverse student body with diverse preparation and learning styles. There is a need to ensure that curriculum content in each discipline is reflective of the full scope of that area of knowledge, and includes diverse voices and views. There is a need to ensure that all students develop skill in negotiating and interacting in the diverse communities in which they will live and in the diverse workplaces in which they will carve their careers.

Our society has become increasingly globalized. The concept of “community” has become international in nature. Our interdependence with other countries with respect to business and economics has made this issue especially compelling. This has had a direct impact on skills needed for success in the workplace and in other aspects of our lives, and internationalization of curriculum content has been recognized as necessary to build these skills.

The explosion in communications and information technology has changed how people communicate and conduct business. Skill in using the current technology has become a prerequisite for negotiating the information environment and for communicating with others. Competence in these areas has therefore become prerequisite to effective learning within the higher education context and to effective career functioning. The rapid change in these areas has led to recognition of the need for development of basic knowledge which supports the ability to adjust to continuously changing hardware, software, functions, and processes.

In general, rapid change has become the norm in many aspects of our society. This has led to the need for improved critical analysis and proactive problem-solving skills, including the ability to create new solutions in an ever-changing information environment. The undergraduate education experience must be structured to support the development of these skills. Teaching that supports such skill development shifts the focus from provision of sets of facts to active learning and synthesizing experiences.

Recognition of the likelihood of continued rapid change has led us to view undergraduate education as the platform for a process of lifelong learning. A substantial number of our students continue their education immediately after completing their undergraduate degree, by entering graduate or professional school. However, we fully expect all of our students to engage in a process of continuous education in order to keep up with the rapidly changing knowledge and skill requirements of the workplace, and the rapid development of new communications and information technologies that will permeate many aspects of society.

For Rutgers undergraduates, the advantages of pursuing their education in the context of a major research university are considerable. First and foremost, they study with a faculty whose members are on the “cutting edge” of their disciplines: creators and not merely transmitters of the knowledge in their fields. Many students comment in their course evaluations, and in the questionnaires they fill out on leaving the university, how important this aspect of their education has been to them. Some are directly involved in their mentors’ research projects, ranging from biotechnical research in the Agbiotech Center, a premier research institute that involves a number of undergraduates in its projects each year, to archeological “digs” undertaken each summer on Rome’s Palatine Hill under the supervision of a Rutgers art history professor, to research in black oral history, part of the Black Atlantic Project sponsored by the Center for Historical Analysis. Many benefit from honors programs given by intellectual leaders in their disciplines, while all departments offer rigorously planned disciplinary and interdisciplinary majors. Rutgers’ rich and diversified faculty resources also include leading figures in the performing arts and from the professional schools, some of which (such as engineering) offer undergraduate as well as graduate programs.

While Rutgers is making a concerted effort to attract gifted and well-prepared students, it is also committed as a state university to providing quality education to a broad and diverse student body. Not all of its entering students have had the best preparation for college. To ensure that underprepared students are able to take advantage as soon as possible of the intellectual opportunities here, the university offers a range of developmental and “gateway” courses in key areas such as mathematics, English, history, and

biology. An impressive percentage of the students admitted finish their degrees successfully and in a timely fashion, as will be discussed at greater length below.

To enhance the teaching mission of its academic departments and professional schools, the university provides a variety of services ranging from teaching and learning centers to those dealing with information and computerization. These are available to all students and to all teachers, whether full-time or part-time. As at all major research universities, some teaching at Rutgers is performed by adjunct instructors and graduate student assistants. Working under the supervision of departmental course-coordinators from the full-time faculty, these teachers, engaged in research projects themselves, are often particularly skilled in transmitting the newest advances in their field to undergraduates. At Rutgers, every effort is made to ensure that the classroom contributions of these teachers are effective. The departments most dependent on them require extensive training sessions; their courses are evaluated by students as are those of all full-time faculty; and they, like the full-time faculty, are encouraged to avail themselves of support services such as those offered by the Teaching Excellence Centers.

In the report that follows, these general observations about undergraduate education at Rutgers—a large and complex research university—will be discussed in detail. The report begins by describing the student body in terms of demographics, academic interests, and preparedness. It then goes on to discuss curricular issues at all levels, from basic courses to advanced research and preprofessional training. Two further sections describe academic enrichment services provided by the university's academic administrative offices to its students, and to its teachers to support curricular initiatives. A final section discusses outcomes, assessment, and directions for the future

WHO ARE OUR STUDENTS?

DEMOGRAPHIC CHARACTERISTICS

While students from all over the country and the world are enrolled as undergraduates at Rutgers, New Jersey residents comprise most of the Rutgers undergraduate student body. Rutgers enrolls approximately 8% of New Jersey college-bound high school graduates. In fall 1996, 88% of the incoming class of first-year students and 90% of transfer students resided in New Jersey. The percentage of all undergraduates who live in New Jersey has averaged around 93% over the last ten years. Because of the predominance of New Jersey residents among the ranks of undergraduates, it is not surprising to find that Rutgers undergraduates closely reflect the diversity that characterizes New Jersey's population.

According to the 1990 census, African Americans comprised over 13% of the state's population, and 10% of New Jersey's residents have a Hispanic background; Asians and residents of other races comprised over 7% of the state's population. The age distribution of New Jersey residents is also quite heterogeneous. According to the 1990 census, the age categories with the highest percentage of residents were the 25-to-34 age category (18%), followed by the 35-to-44 age group (16%), the 45-to-54 age group (11%), and the 55-to-64 age group (8%).

New Jersey is also a magnet for new immigrants. Data from the U.S. Immigration and Naturalization Service show that New Jersey ranks fifth among all states in the number of immigrants who settle within its boundaries. In addition, the number of foreign-born residents has grown steadily over the last 40 years.

In 1950, the number of New Jersey residents who were born in a foreign country was slightly over 600,000. By 1990, this number had grown to just under 1,000,000 residents.

Projections show that the state's demographic profile will continue to become more diverse. For example, according to the New Jersey Department of Labor's projections, African-Americans will comprise 15% and other nonwhite races will exceed 8% of the state's population by the year 2005.

Given the state's demographic diversity, it is not surprising to find that Rutgers undergraduates possess a similar demographic profile. African-American students represented 11% of the fall 1996 incoming first-year class. Asian and Latino students also constituted substantial segments of the fall 1996 incoming class (20% and 10%, respectively). White students comprised the highest proportion of fall 1996 transfer students (58%), while Asian (14%), African-American (10%), and Latino (8%) students are also well represented among transfers.

This diversity of the Rutgers incoming undergraduate population is also reflected in the percentage distribution of the entire undergraduate student body, with white students representing 56%, Asian students representing 17%, African-American students representing 11%, and Latino students representing 10% of all undergraduates in the 1996 academic year. This compares to 72% white, 11% African-American, 7% Asian, and 6% Latino among undergraduates in 1986.

Other indices of the demographic diversity of Rutgers undergraduates include age and gender. In fall 1996, Rutgers enrolled more female than male undergraduates (54% to 46%, respectively), and about two-thirds of its undergraduate student body consisted of traditionally aged students—61% of students enrolling in fall 1996 were between 18 and 21 years of age. Approximately 38% of all undergraduates were 22 years of age and older.

The heterogeneous character of the Rutgers student population is the culmination of a historical trend that began as early as the 1960s when minority, female and older students began to enter the university in larger numbers than ever before. Moreover, projections such as the increasing intention of New Jersey high school graduates to attend postsecondary institutions suggest that the trend of student diversity witnessed over the recent past at Rutgers will continue to expand into the next century.

SOCIOECONOMIC CHARACTERISTICS

Another dimension to New Jersey's diversity can be found in the socioeconomic status of its residents. On the one hand, New Jersey is a state with many high-technology industries, a well-educated workforce, and one of the highest per capita household incomes in the nation. New Jersey is home to many of the major pharmaceutical companies in the world and is firmly situated in the rapidly growing field of information technology. According to the 1990 United States census, 32% of all New Jersey workers 25 years of age and over have a managerial or professional occupation. Approximately 25% of its citizens over the age of 25 have a baccalaureate degree, and approximately 46% of New Jersey residents 25 years of age or older have been enrolled at some collegiate level. New Jersey has the second highest median family income and per-capita income of all states in the nation. Suburban communities with high-achieving school districts and minimal social problems are an essential feature of the state's residential landscape.

Yet there is also another side to New Jersey's socioeconomic character. A substantial part of New Jersey's economy has its genesis in an earlier, more industrialized period of American economic history. It has an urban core that continues to adjust, albeit painfully, to major economic transformations that have

defined the United States economy during the latter part of the 20th century. Many of its citizens live in inner-city areas that are bereft of many of the advantages that New Jersey suburban residents have. An overabundance of resources in these urban areas is committed to criminal justice functions (e.g., the police and court system) and to the provision of basic social services for many inner-city residents. Data collected by Mortenson (1996) show that the ratio of expenditures by the state of New Jersey on social investment such as higher education relative to expenditures on social problems (e.g., criminal justice and social welfare services) is below that of 60% of other states.

These problems are compounded by the low family income and per-capita income of many areas in the state. In addition, according to the Census Bureau, in 1994 New Jersey had slightly over 9% of its citizens living at or below the poverty level. Six % of New Jersey residents received some form of public assistance in 1994. New Jerseyans also vary in their educational achievement. Although almost half of its adults have attended college at some point during their lifetime, a majority of New Jersey adults (54%) have attained no more than a high school diploma.

We get glimpses of the heterogeneous socioeconomic status among Rutgers undergraduates from their responses to selected questions on the ACE/UCLA Cooperative Institutional Research Program (CIRP), which is a survey that first-year students are asked to complete at the time of their college orientation. With regard to parental income, 22% of Rutgers undergraduates who responded to the CIRP survey in fall 1995 indicated their parental income did not exceed \$30,000. Forty-four % of Rutgers undergraduates came from families whose parental income was between \$30,000 and \$75,000, while 33% of undergraduates participating in the CIRP survey stated that their parents had an annual income exceeding \$75,000.

In addition, 45% of these first-year undergraduates indicated that the highest educational level attained by their fathers was at least a college degree, while 28% indicated that their fathers' highest level of education was a high school diploma. With respect to mothers' educational level, 45% stated that their mothers had at least a college degree, while 34% stated that their mothers' educational level did not exceed a high school diploma. Thus it is clear from these responses that Rutgers undergraduates come from all levels of the socioeconomic and education ladder.

ACADEMIC PREPAREDNESS

Not only are Rutgers undergraduates diverse in their demographic and socioeconomic characteristics, but students entering the university vary widely in their preparedness to pursue their academic studies. Because of the unevenness of quality education at the secondary level within the state, not all students enter the university equally prepared to pursue undergraduate studies. This unevenness is revealed by various programs and data. For example, the Educational Opportunity Fund (EOF) is a state-mandated program requiring that 10% of the New Jersey resident enrollment at public colleges and universities consist of students who would otherwise not necessarily meet the standard admission requirements. The university also sets aside an additional 5% of its admitted class for students who, for a variety of reasons, would not be accepted into Rutgers without special consideration.

Beyond these distinctions in the admissions process, other indices that reveal variations in the academic preparedness of undergraduates at Rutgers include their performance on Rutgers placement tests when entering the university and their high school academic profiles. For example, in fall 1994, a total of 1,319 students were placed into remedial mathematics and English courses, representing 18% of the total incoming fall 1994 class. The high school academic performance by Rutgers' incoming students also

shows differences in their academic preparedness. For example, the mean combined SAT score of first-year students who entered Rutgers in fall 1996 was 1139, well above the state and national averages of 1003 and 1013. However, while 25% of these students attained a combined SAT score of 1250 or greater, 12% of entering students did not achieve a combined score greater than 950. In addition, while the mean high school percentile rank of enrolling first-year students in fall 1996 was 79, 11% of these students ranked in the 60th percentile or lower.

These variations in the academic preparedness among incoming students to Rutgers do not imply a violation of the high standards of undergraduate academic quality offered by Rutgers. Rather, they indicate challenges to the university community to ensure that the standards of excellence in undergraduate education at Rutgers are maintained. Indeed, we must remember that these are indices of the academic preparedness and not of the academic potential of undergraduates during their studies at Rutgers.

The majority of Rutgers undergraduate students enter directly from secondary school. However, a sizeable percentage of Rutgers students transfer after beginning their higher education experience at another institution. The majority of these transfer students come from New Jersey county/community colleges. The large number of transfer students is an additional source of variation in the knowledge and skills which students bring to Rutgers. The following table shows the number of first-year and transfer students enrolled for the past five years.

First-Year and Transfer Students Enrolled

| | First-Year | Transfer |
|------|------------|----------|
| 1992 | 5002 | 2285 |
| 1993 | 5251 | 2295 |
| 1994 | 5106 | 2226 |
| 1995 | 5447 | 2402 |
| 1996 | 5681 | 2352 |

STUDENTS' ACADEMIC INTERESTS

Rutgers offers over 100 programs from which students can choose a major. Over the last five years, a number of new undergraduate majors have been added to adjust to a changing environment and changing student interests and needs. These new programs are:

- B.A. Journalism—Newark College of Arts and Sciences
- B.A. Women's Studies—Newark College of Arts and Sciences
- B.S. Marketing—School of Business—Camden
- B.S. Finance—School of Business—Camden
- B.A. Medieval Studies—Douglass College, Livingston College, Rutgers College, University College—New Brunswick
- B.S. Management Science and Information Systems—School of Business—New Brunswick jointly with Douglass College, Livingston College, Rutgers College, University College—New Brunswick

B.A. Environmental Sciences—Newark College of Arts and Sciences
 B.A. in Liberal Studies—University College–Camden.

Currently, the top five majors for Rutgers students are psychology, biological sciences, English, pharmacy, and accounting. Trends in the popularity of majors at Rutgers over the last ten years can be seen in the table below. Biological sciences has gained significantly in popularity, as have pharmacy and environmental science.

ENROLLMENTS BY MAJOR—UNIVERSITY-WIDE

| 1996 | | 1990 | | 1986 | |
|------------------------|------------|------------------------|------------|------------------------|------------|
| Major | Enrollment | Major | Enrollment | Major | Enrollment |
| Psychology | 1557 | Psychology | 1565 | Economics | 1566 |
| Biological Sciences | 1522 | English | 1338 | Management | 1174 |
| English | 1075 | Accounting | 1217 | Psychology | 924 |
| Pharmacy | 922 | Biological Sciences | 1085 | English | 835 |
| Accounting | 862 | Economics | 1013 | Computer Science | 676 |
| Political Science | 696 | Political Science | 942 | Biological Sciences | 652 |
| History | 688 | Management | 774 | Political Science | 645 |
| Economics | 604 | Pharmacy | 727 | Accounting | 644 |
| Computer Science | 505 | History | 722 | Electrical Engineering | 629 |
| Environmental Science | 485 | Computer Science | 565 | Communications | 431 |
| Electrical Engineering | 464 | Electrical Engineering | 558 | Pharmacy | 392 |

CONCLUSION

Given the diversity of the Rutgers undergraduate population, the task of providing students with a quality undergraduate education is very complex. A commonly accepted notion regarding undergraduate educational success is the importance of student/institutional fit. What may be successful at a small, private liberal arts college with a homogeneous student population may not work at a large, public research university with a heterogeneous student population. Indeed, the plethora of academic support and enrichment programs, student life activities and associations, and community service programs at large, public research universities indicates the challenge that confronts Rutgers in its efforts to facilitate student integration into the intellectual and social life of the university. Moreover, the complexity of this process makes the effort to assess an institution's success in delivering a quality education to its undergraduates difficult but no less critical. And it is on this consideration that much of the following report on undergraduate education at Rutgers will focus.

EDUCATIONAL GOALS FOR OUR STUDENTS

As a research university, Rutgers offers an outstanding environment for undergraduate students. The faculty consists of individuals who are internationally known in their areas of expertise and who are leading the way in advancing their disciplines. Outstanding libraries and laboratory facilities provide the additional resources needed for an institution that is effectively accomplishing its mission to create new knowledge. During the 1990s, Rutgers has been engaging in a number of strategic activities in order to ensure that undergraduates are profiting from the outstanding educational resources that are present at this Association of American Universities (AAU) institution.

In 1992, President Lawrence appointed the university Committee on the Undergraduate Curriculum and charged it with conducting a review of the undergraduate curriculum and with recommending university-wide curriculum standards. The committee produced a report, *Rutgers Dialogues: A Curriculum for Critical Awareness*, that called for changes in curriculum content, in teaching methods, and in the role students play in the classroom. The report called for a curriculum that would not only prepare students for a career, but also enrich their lives by engendering an understanding of the cultural context in which we live, and would prepare students to participate fully as citizens of a democratic, multicultural society.

After the report was issued, the Vice President for Undergraduate Education structured a discussion and decision-making process to focus on establishing university-wide standards that would allow campuses, colleges, and schools within the university to identify their commonalities as university citizens, while at the same time supporting the uniquenesses of each of these units. The process emphasized participation and consensus-building. Every faculty member received a copy of the report, and copies were made available to students through the student governing associations. All deans whose colleges or schools provide undergraduate programs or courses were asked to prepare a written college or school response to the report, resulting from discussion among unit faculty members and curriculum committees. In addition, a number of faculty and student governance bodies—including the university Senate Educational Policy and Planning Committee, the President's Student Advisory Council, and the Undergraduate Education Student Advisory Board—were asked to respond to the report. Public forums were held at locations throughout the university to provide additional mechanisms for obtaining input from students and faculty.

Interspersed with these forums were presentations and panel discussions by internal and external experts that addressed national and local perspectives on the issues raised in the report. A university Undergraduate Curriculum Steering Committee, with representatives from each college and school, was charged with reviewing the responses to the report and generating recommendations.

Based on the responses to the *Rutgers Dialogues Report*, the university Undergraduate Curriculum Steering Committee developed a set of university-wide learning goals that were subsequently approved by all decanal units. The goals define the common curricular ground that unites the university. They are purposefully broad so that the various campuses, colleges, and schools can continue to develop their unique identities through varying ways in which the goals are met, given the mission of the academic unit. They allow for the development of multiple creative implementation methods that can be tailored to different types of student and faculty strengths and interests.

The goals define the skills and knowledge that all Rutgers students will acquire to support their development as responsible citizens and as productive contributors to society in their workplaces and in their intellectual, cultural, and social endeavors. The goals are grouped in three areas. Intellectual and communication skills are the basic skills necessary for acquisition, analysis, and communication of information. These skills include critical thinking, communication skills, mathematical reasoning and analysis, scientific inquiry, and information and computer literacy. Goals in the area of understanding human behavior, society, and the natural environment focus on the major areas of knowledge necessary to function effectively in our society. These include historical understanding, multicultural and international understanding, understanding of literary and artistic expression, understanding of the bases of individual and social behavior, and understanding of the physical and biological world. Goals in the area of responsibilities of the individual in society address the skills and knowledge essential to effective citizenship in a democratic society and to ethical social functioning. These include citizenship education and social and ethical awareness.

In response to these goals many colleges, schools and departments have made changes in graduation requirements, have developed new courses, and have revised existing courses. In order to support development of innovative ways of meeting these goals, the Vice President for Undergraduate Education developed an internal grant program. Rutgers Dialogues Grants provide about \$100,000 a year to support faculty and professional staff initiatives that focus on meeting the university-wide learning goals. This program is currently in its fourth year; many of the pilot projects spawned by the program are being implemented on an increasing scale and are becoming institutionalized. A description of some of these projects follows.

- The Douglass College first-year seminar, *Shaping a Life*, was designed to develop oral communication, written communication, and critical thinking skills. The course eases the transition to college and introduces students to the mission of Douglass by focusing on women's lives in the living and in the telling. In 1996–97, the entire first-year class participated in the course.
- The Freshman Seminar Program in Newark also focuses on increasing oral communication, written communication, and critical thinking skills through small classes for first-year students. In preparation for the seminars, faculty members participate in faculty development activities that address interactive approaches to teaching. The small-group setting of the seminars encourages faculty-student interaction.

- A number of projects have been funded that address the issue of improving communication skills. These include a set of efforts to link writing courses to other disciplinary courses and to encourage writing across the curriculum. This approach has also been supported through deans' offices and is being targeted for additional effort through the *University Strategic Plan*.
- Through a Dialogues grant, the Department of Mathematics in New Brunswick started an effort to improve calculus instruction in large introductory courses. Lecture size was substantially reduced and small-group active learning is facilitated by peer mentors in recitation sessions. This effort is strongly endorsed by the *University Strategic Plan* and has received seed money from the first round of Strategic Resource and Opportunity Analysis (SROA) funds.
- Through the Rutgers Dialogues grants, various efforts have also been launched to support the development of student computer and information literacy. A number of science and social science departments have upgraded their laboratories to include computerized demonstrations and interactive assignments. Other departments have received funds to develop department home pages that offer students new ways to obtain course-specific material, to communicate with faculty, and to communicate with each other. In addition, the Camden campus library has created an online tutorial to assist students in the use of information resources.
- The course, Building the Future: Planning as Citizenship, has become one of the largest-enrollment courses on the Camden campus. Through this interdisciplinary course which addresses citizenship education, students learn about their roles as citizens in the planning process. The course uses the *New Jersey State Plan* to focus on the specific challenges to South Jersey: decay and revitalization in the city of Camden, sprawl and congestion in the suburbs, and local efforts to preserve the environment. Although each project has included some plan for evaluation, the need for a thorough and comprehensive evaluation of pilot programs has been identified. To this end, a Curriculum Innovation Evaluation Service has been developed through the Office of the Vice President for Undergraduate Education. The Service will utilize expertise in educational program evaluation from the Graduate School of Education in assisting academic units to develop and implement comprehensive evaluation plans for curriculum innovation being considered for large-scale implementation. Douglass College's Shaping a Life Program is the first project undergoing this comprehensive evaluation.

At this time there is need for consideration of a more comprehensive means of assessing student goal attainment. Although students are evaluated in individual courses, a number of departments use additional methods of assessing student learning in the major. Furthermore, while Rutgers maintains a range of information on retention and graduation rates, methods of directly assessing student achievement relative to the learning goals should be developed. One school, the Graduate School of Education, has begun to do this. With funds from the Teaching Evaluation Development Grant Program, administered by the Office of the Vice President for Undergraduate Education, faculty members have developed the Teacher Education Instrument (TEI) in order to evaluate their new five-year teacher education program. The TEI measures knowledge and skills specific to teaching, as well as knowledge and skills related to the university-wide learning goals. In 1997, the TEI will be administered to the first cohort of five-year teacher education students. This instrument and the process used in its development can serve as a model for other academic units.

CURRICULUM ISSUES

WRITTEN AND ORAL COMMUNICATION

Introduction

Writing and speaking are two of the most fundamental skills necessary for academic achievement within a university and for successful employment after graduation. University faculty have consistently noted the necessity for students to improve their communicative abilities, particularly in writing. Numerous business leaders have expressed their desire for entry-level employees to be effective public speakers as well as cogent writers.

Rutgers is committed to helping students develop the written and oral communication skills they need. Nevertheless, the university faces an enormous challenge in providing this training. Students come to the university from a variety of backgrounds and with great variation in their preparation for college-level work. For example, 52% of the students enrolled in the Newark College of Arts and Sciences come from homes in which English is not the primary language. University College students in New Brunswick may not have written a formal essay for a decade or more. Rutgers also enrolls some of the top students from New Jersey high schools. Thus, programs must be offered that not only meet the needs of students who require extensive remedial work, but also challenge more advanced students.

In addition to the variety of courses that must be offered, providing effective written and oral communication training for students requires a large commitment of faculty time. Learning to write and speak effectively requires extensive interaction between student and instructor. Courses that provide individual feedback to students—courses essential to teach specific writing and speaking skills—must be limited to a manageable number of students

Basic Writing Requirements

All three campuses of Rutgers offer comprehensive writing programs in the English departments of the three Faculties of Arts and Sciences. All entering first-year students and transfer students are tested in communication skills and placed in the appropriate writing course, from remedial to advanced. Students who perform well in the placement tests are enrolled in honors sections of writing courses. All three writing programs offer a range of remedial courses for students who lack sufficient skill for the first-year composition course. Credit-bearing “English as a Second Language” (ESL) courses also are offered. Several hundred transfer students admitted to the university each semester are tested and placed in writing courses or exempted from the writing requirement based on prior course work.

Students in need of remediation have a variety of resources available to them. For example, the New Brunswick campus has three writing centers to assist students in improving their writing skills. The EOF programs provide skills courses for their students during the summer before they enter Rutgers, as well as during the first and second years of enrollment.

In addition to the basic writing requirements, the graduation requirements of both the liberal arts and professional schools require students to complete additional courses that involve writing. For example, Cook College requires students to complete two courses selected from courses such as Scientific and Technical Writing, Public Speaking, and News Writing. Rutgers and Douglass Colleges require a second

writing course selected from the list of approved courses that contain significant writing components. University College and Livingston require two semesters of composition.

In addition to the full-time instructional staff in the writing programs, instructors are drawn from graduate students in the arts and sciences departments. All three writing programs offer comprehensive training programs for their instructors. Many of the graduate students have found that the experience of teaching first-year students has enhanced their credentials in the job market. The New Brunswick Writing Program has developed a variety of mechanisms to maintain high standards including extensive “folder reviews.” Student papers are read by several faculty members before the final course grade is assigned. The writing programs in Camden and Newark have similar arrangements.

Writing across the Curriculum

The New Brunswick campus has established a variety of initiatives to enhance writing across the curriculum. A new second-year writing course, *Dialogues in the Professions*, is specially designed to be linked to discipline courses. Students are concurrently registered in the writing course and in a course in life sciences, history, physics, philosophy, or other disciplines. Identical content and writing assignments are used in both courses. Between five and ten such linked courses are offered each semester. These courses have proved successful with both high-achieving and remedial students.

Plans are under way on the Newark campus to establish new programs in writing across the curriculum.

The School of Business in Camden requires all students to take a course in business communication. Many of these classes involve conducting projects for local firms, and executives from these companies may attend the class presentations. Thus, students learn real-world presentation skills that are necessary for success in the business community.

Future Directions

Corporate leaders have emphasized the importance of writing and speaking skills for graduates who enter the work force. Equally, of course, excellent communication skills are also necessary for success in graduate and professional school programs. Rutgers is committed to the emphasis on writing across the curriculum and to the technical support necessary for the teaching of writing. This will be one of the highest institutional priorities for the next few years.

The Committee for the Future has strongly endorsed writing/speaking at Rutgers as a priority of the *University Strategic Plan*. This area also received funds in the first SROA allocation cycle. These funds will help to revamp basic writing courses to place increased emphasis on oral communication and computer-based research skills. In addition, the new technologies should be used to develop more mechanisms for helping students develop better writing skills. For example, use of email communications in these courses could allow for more interstudent collaboration on writing, and development of an online writing lab would provide an easily accessible means of assistance for students.

It is also important that writing continue to be linked more closely to other disciplines by incorporating writing assignments into course work in a wide variety of subject areas. Written and oral communication skills should be emphasized in a range of courses—identified as writing courses—outside of those given by the English departments, in order to ensure continued development of these skills throughout students’ academic careers.

IMPROVING COMPETENCY IN MATHEMATICS AND SCIENTIFIC LITERACY

Introduction

Science, mathematics, and technology have transformed the face of the globe and the character of daily life. In August of 1994 the Clinton administration issued a science policy statement, *Science in the National Interest*, that recognized the fundamental importance of science and mathematics in an information-age society and established a number of national objectives, among them: (1) to maintain leadership across the frontiers of scientific knowledge; (2) to produce the finest scientists and engineers for the 21st century; (3) to raise the scientific and technological literacy of all Americans. Through our undergraduate programs, we are engaged directly in the training of the next generation of scientists and in the education of scientifically literate citizens.

Introductory Courses

Undergraduates at every unit on every campus must complete courses in the sciences and/or mathematics. The minimum is six credits (normally two courses) in either mathematics or the sciences for students in the B.F.A. programs. A nine- or twelve-credit requirement that can be met only by taking both mathematics and science is typical for the liberal arts colleges; it also applies to students who enroll in upper-level undergraduate programs such as those of the Schools of Business, Social Work, and Education. Students at the technically oriented professional schools—Cook College, and the Colleges of Pharmacy and of Engineering, for example—must take many semesters of mathematics and science to graduate.

To satisfy these requirements most students enroll in introductory courses. What the students experience in these courses has a strong immediate influence on their career paths and a lasting effect on their attitudes toward the subjects. The challenges faced by science and mathematics departments are: (1) to keep introductory courses up to date and at a level of rigor that comports with both the standards of the disciplines and the abilities of the students; (2) to find ways to allow students to participate in active learning, given a level of staffing constrained by declining state budgetary allocations and governed in part by competition with other university needs; and (3) to offer first-rate laboratory instruction. To make the basic science and mathematics courses as effective as possible, faculty members have been stressing the use of active learning techniques for improving student comprehension and retention, as indicated by the following two examples.

- The mathematics department in New Brunswick has undertaken a comprehensive program of calculus reform. In an effort to strengthen the first-year calculus course taken by science majors, the mathematics department has decreased class size, and has introduced graphing calculators, workshop sessions, and peer mentoring. These changes permit increased emphasis on conceptual understanding and the ability to work on open-ended, non-routine problems. As a strategic planning priority and with the support of SROA funds, the department is now extending these ideas.
- On the Newark campus, an innovative introductory physics laboratory course has been developed with substantial and renewed support from the National Science Foundation (NSF). Teaching strategies are geared to the needs of a diverse urban population. Those strategies include non-intimidating but rigorous discovery-based and goal-oriented experiments that

provide a meaningful and accurate introduction to the excitement and creativity of scientific discovery and analysis.

Introduction to the sciences and mathematics is not restricted to lecture-type surveys. Courses taught in smaller sections are aimed at communicating the increasingly interdisciplinary and open-ended nature of science to non-majors. One example is a course that introduces non-scientists to the nature and implications of the greenhouse effect. It was created with university and NSF support through the collaboration of faculty members from four different disciplines—physics, biology, chemistry, and meteorology. A second illustration is the first-year seminar required for all Cook College students, in which students learn how research is applied to problems of agriculture and the environment. The course examines the economic, political, social, and ethical dimensions of these problems to emphasize the point that science and technology alone will not resolve them. The Camden campus course, *Science, Technology, and Society*, in which about 40% of all undergraduates enroll, is a third example. It engages both natural and social scientists in a dialogue on a different theme each semester.

Finally, in connection with the demand for and the nature of introductory courses, it should be noted that the sciences and mathematics are playing ever more important roles in disciplines outside their historic purview, e.g., psychology, economics, sociology, and archaeology. This trend toward greater interdisciplinarity, which is exemplified by the recent introduction of a stiffer mathematics requirement for all psychology majors in New Brunswick, fuels a growing demand for introductory courses and for some higher-level courses as well.

The Major

Rutgers offers a wide variety of undergraduate majors and programs for students who wish to specialize in mathematics and the sciences. Majors in the core scientific disciplines—biology, chemistry, physics, and mathematics—are available on all three campuses. Developing interdisciplinary areas such as biochemistry and neuroscience are also represented on all three campuses, although they may appear under the listings of other departments, e.g., biochemistry under biological sciences or under chemistry, and neuroscience under biological sciences. Specialized instruction in the applied sciences and mathematics is offered by the professional schools: agricultural science by Cook College, health sciences by the Colleges of Pharmacy and Nursing, and engineering by the College of Engineering, for example.

The specialized programs for students majoring in science, mathematics, and closely allied fields are associated with a set of issues that must be addressed in order to ensure appropriate and effective undergraduate education. These issues include providing access for a changing student population; maintaining curricular levels at the state-of-the-discipline; offering opportunities for students to engage in research; and making sure that undergraduates are educated in matters related to computers, communication, and professional ethics.

In response to changing societal conditions, science faculties have taken steps to diversify the paths that their majors may take toward completing the undergraduate degree. Two examples are the “applied” options of the physics departments in New Brunswick and in Newark. Science faculties have also adjusted the traditional scheduling of course offerings to accommodate the financial and time constraints faced by today’s students. Examples of efforts in this direction are the B.A./M.D. program in biological sciences, which shortens the time to degree, and the increased number of science courses now taught during the evenings. Starting in fall 1997, for example, all the courses required for a biology major in New Brunswick can be completed in the evening. In addition, as discussed in the section on Research and Creative

Activity, several programs have been designed and implemented to increase the number of minority students who major in the sciences and mathematics.

Undergraduate curricula in the sciences and mathematics are constantly updated to keep pace with new discoveries and the latest research. For example, a massive reorganization in biological sciences is now under way in New Brunswick that will create four units devoted to: (1) cell and molecular biology, (2) genetics and evolutionary biology, (3) tissue and organismic biology, and (4) ecology and biodiversity. A separate administrative unit will provide the first two years of instruction in biology. A new undergraduate program in remote sensing has been developed. At Newark, the Department of Geological Sciences has created an environmental curriculum and an option in geoscience engineering, in cooperation with the civil engineering department at the New Jersey Institute of Technology. Faculty members from around New Brunswick are crossing academic unit lines to create an interdisciplinary program for undergraduates interested in materials science. Cook College has created a popular biotechnology program.

An excellent way for undergraduates to learn about the latest developments in their disciplines is to do research. While undergraduate research is common in many disciplines, it is an especially strong tradition in the sciences where faculty members stress the importance of laboratory, library, computer, and field research.

Interdisciplinary Concerns

To an increasing degree, the curricula in the sciences and mathematics are including instruction in areas beyond traditional boundaries. Three such areas deserve special mention: computers, communication, and ethics.

Computers and associated digital technology have profoundly altered the way that scientists and mathematicians work. The changes are so rapid, varied, and, in some cases, specialized that each discipline needs to provide some of its own instruction in this area. The signs of the digital revolution are everywhere. In Newark, undergraduates' readiness to enter the chemistry laboratory is assessed by computer-administered quizzes. In courses offered by departments of chemistry and biochemistry around the university, students can see and manipulate three-dimensional displays of complex molecules. Students in geology carry out simulations of climate change on a global scale. Mathematicians invite undergraduates to share in a process of discovery at the computer that was previously limited to those with advanced analytical skills. Across the university, new "smart classrooms" provide connections to the World Wide Web.

Professional workers in the sciences and mathematics need the ability to communicate effectively, both orally and in writing, with specialists and non-specialists alike, and departments are responding in several ways. The mathematics department in New Brunswick has created new workshops for certain junior/senior-level courses taken by all its majors. Groups within each workshop divide problems too large for any one student to solve alone, and then craft a unified solution and present it to the entire class. The Department of Biological Sciences has experimented with linking courses in science with courses in writing. Units in chemistry and biochemistry are offering "capstone" seminars, which not only sharpen students' communication skills but also help them to integrate what they have learned over several years and to reflect on the nature of their major.

Science and mathematics students are being encouraged to develop their communication skills in settings outside as well as inside the classroom. Science departments in New Brunswick have added

sections to courses for majors in which students share their knowledge with community organizations, e.g., the Liberty Science Center and local elementary schools.

Public concern about the integrity of scientists has encouraged—though it is not solely responsible for—disciplinary efforts to have students look squarely and systematically at ethical issues. The credo of the School of Engineering reads in part:

Engineering undergraduates must be taught the importance of making responsible professional engineering decisions consistent with the safety, health, and welfare of the public, as well as the importance of disclosing conflicts of interest, rejecting bribery, offering honest criticism of technical work, acknowledging and correcting errors, and properly crediting the work of others.

At Cook College, the graduation requirements include five credits of interdisciplinary/ethical analysis. In Newark, a new offering from the philosophy department aimed at students from both Rutgers and the New Jersey Institute of Technology examines environmental ethics.

Future Directions

A recent NSF study of the undergraduate origins of science and engineering doctorate recipients from 1991 to 1995 reveals that Rutgers ranks sixteenth among all ($n = 820$) institutions and sixteenth among AAU institutions. The following table provides information that supports the fact that Rutgers provides excellent preparation in the sciences.

**Science and Engineering (S&E) Doctorate recipients, 1991–95, by Field
with the Number, Percentage and Rank of Doctorate Recipients
Who Received Baccalaureate Degrees from Rutgers**

| Field of Doctorate | Total Doctorate Recipients, 1991–1995, from U.S. institutions | Rank of Rutgers among all institutions | Rank of Rutgers among AAU institutions |
|-----------------------|---|--|--|
| Total S & E | 76992 | 16 | 16 |
| Physical Sciences | 13597 | 17 | 17 |
| Mathematics | 2512 | 17 | 16 |
| Computer Sciences | 2203 | 42 | 36 |
| Biological Sciences | 17301 | 9 | 9 |
| Agricultural Sciences | 2650 | 21 | 15 |
| Psychology | 15060 | 12 | 12 |
| Social Sciences | 11731 | 30 | 27 |
| Engineering | 11938 | 27 | 21 |

Rutgers has a substantial record of achievement in undergraduate education in the sciences and mathematics. As circumstances and the disciplines themselves change, however, we must continually make improvements and try to anticipate future needs.

Introductory courses absorb a large share of departmental teaching resources, especially where laboratories are corequisites, and over the long run affect departmental size. Thus both educational and financial considerations compel ongoing institutional attention to this group of undergraduate offerings. Several strategies should be adopted to make sure that introductory courses are of high quality. First, to the degree that resources permit, departments should use new computer and information technology: (1) to take over the management of certain routine assignments; (2) to encourage interactions among students through electronic mail; and (3) to enhance and widen the curricular content. Second, departments should make full use of all teaching talent available. Students can often benefit from interactions with peer mentors and graduate students who have received appropriate training. Third, faculty members must look more aggressively to outside agencies for support in modifying curricula and in developing corequisite laboratories, an activity already encouraged by the university's Undergraduate Curriculum Seed Grant Program.

In the allocation of teaching resources, introductory courses for nonmajors must compete with the legitimate demands of survey courses, upper-level courses, and graduate courses. Even so, the courses aimed at nonmajors must retain their niche in the undergraduate curricula because they are crucial in the creation of a scientifically literate public.

To ensure that we continue "to produce the finest scientists and engineers for the 21st century," we need to address five points in curriculum development and delivery that affect students majoring in science and mathematics.

- (1) Through continuing faculty and departmental oversight, we must see to it that our curricula keep up with the rapid march of modern developments, without sacrificing established verities.
- (2) We must maintain our commitment to engaging students in the research process both by incorporating the results and methods of research in the classroom and by offering, at the introductory and higher levels, opportunities for hands-on experience in the field, in modern laboratories, and in up-to-date computational facilities.
- (3) We should extend the use of active learning methods in the classroom and continue to develop methods that are complementary to the traditional lecture. Departments should offer seminars for majors and an expanded set of specialized courses for honors students.
- (4) We should use instructional technology to convert the abstract into vivid images and sound, and to extend the range of sources from which information is taken.
- (5) A point crucial to the health of the experimental sciences warrants special mention. To be well trained, students in these areas need opportunities to use modern instrumentation. Accordingly, the university must constantly work to keep the equipment in instructional laboratories up to date, both by providing the necessary funding internally and by encouraging

faculty to search for other sources of support. This is strongly endorsed in the *University Strategic Plan*.

Finally, scientists and mathematicians in particular need to make every effort to place what they teach to undergraduates into a societal context. Only in this way will its importance be clear and—it is hoped—valued by the great majority of students who will form tomorrow’s public.

RESEARCH AND CREATIVE ACTIVITY

Introduction

Our vision of a research university is one in which research is fully integrated in the education of undergraduates. Our goals are to ensure that all undergraduates have the knowledge and skills to understand the nature of research and can make effective use of its results; to provide opportunities for all undergraduates to participate in research activity; to train adequate numbers of future researchers in areas of societal importance; and to improve the dissemination and use of knowledge.

We want to ensure that all undergraduates learn about research as part of a systematic developmental process and that interaction between research-active faculty and undergraduates is strengthened. Our objective is to introduce all students to research early in their academic careers and then to provide education regarding research throughout the undergraduate curriculum. We wish to infuse information about research into a variety of courses and to increase the number of opportunities for students to conduct research under the mentorship of faculty members and through partnerships with industry and public agencies. Several programs at the institutional level have been initiated to realize these goals.

Current Status

The Vice President for Undergraduate Education has sponsored a series of “undergraduate research roundtable” discussions with faculty members from across the university to consider the nature of an undergraduate research university experience and to suggest ways to ensure that students benefit fully from the research university environment. Roundtable participants concluded that research is important for all students. While some students need to learn the skills necessary to conduct research and to create new knowledge, all students should learn how to be critical, analytic consumers of research. It was recommended that the university pursue a two-pronged approach to integrating research with undergraduate education: (1) develop mechanisms to increase student interest in research; (2) expand the number and variety of research opportunities. Several programs address these recommendations.

In order to increase the level of interest, a brochure on undergraduate research was published and sent to all second-year students. The brochure explains what it means to attend a research university, describes the relevance and advantages of a research experience for undergraduates, and directs students to more detailed information available on a Web site.

On the new undergraduate research Web site (<http://www.rci.rutgers.edu/urru>) students can find descriptions of over 300 specific research opportunities. Each listing describes the nature of the opportunity, student participant characteristics, student product outcomes, and the name and phone of a contact person.

In order to expand the number and variety of research opportunities and to increase faculty/student collaboration on research projects, the Rutgers Undergraduate Research Fellows Program has been created.

The program supports approximately 40 research projects involving collaboration between faculty and undergraduates from all disciplines.

The New Brunswick Teaching Excellence Center has held a series of symposia on the general topic of how research methods and findings inform both class content and the manner in which that content is presented. The topics considered were research faculty in the classroom, redesigning introductory courses to bring research into the classroom, creating opportunities for student research, and bringing research into the classroom with technology.

Internal grant programs aimed at general curricular innovation and improvement (the Rutgers Dialogues Grants Program and the Undergraduate Curriculum Seed Grant Program) have supported several faculty efforts to infuse research and creative activity into the undergraduate curriculum. Some examples of projects supported by these programs follow.

- A new senior-level undergraduate course has been developed that brings together industrial engineering and pharmacy students for the study of pharmaceutical manufacturing and for work on team research projects supervised by industrial partners in the pharmaceutical industry.
- The Department of Marine Sciences of Cook College–New Brunswick, is developing a new course in oceanographic methods and data analysis. The course will provide undergraduates with hands-on experience, including analytic training in the laboratory, customized computer exercises, and a day at sea collecting and analyzing samples aboard a scientific research vessel.
- In Newark, the Department of Biological Sciences is creating a new course to introduce urban students to the spatial and temporal heterogeneity of habitats and environmental settings that are less intensively manipulated by humans. The course will include field trips to gather data at five natural areas in northern New Jersey where students will receive hands-on training in the use of state-of-the-art as well as classical instrumental techniques for environmental mensuration.
- In a new course offered by the Mason Gross School of the Arts (MGSA), undergraduates conduct oral histories with eight visiting Latina artists for a collective set of essays. They also work with the artists in creating new work for exhibition in the MGSA art galleries.
- The Department of Spanish and Portuguese in New Brunswick holds an annual research symposium in the spring. To encourage meaningful participation by undergraduates, instructors in literature and upper-level language courses structure their courses to include discussion, reading, and writing assignments that engage students with the debates that currently characterize the field.

These university-wide programs complement a rich array of research activities for undergraduates that originate at the level of the academic unit. Almost every department grants credit for independent study. Indeed, Cook College has introduced a new experiential requirement, which students satisfy by working in a university setting or in an industrial or government laboratory. The nature of independent study varies from unit to unit, but more often than not includes a research project under the direction of a faculty member. In the sciences especially, research carried out under the rubric of independent study is regarded

as a very valuable educational experience for all students. Participation is encouraged through advising and through departmental Web pages.

Honors programs are discussed in another section of this report. Here we note only that a structured introduction to research at the sophomore or junior level is an increasingly common feature of many such programs (e.g., the honors programs at Cook College and the Newark College of Arts and Sciences), and that virtually all honors programs require a significant senior research project.

Many projects around the university encourage underrepresented groups (women and minority students) to study the sciences and mathematics by providing them with research experience under the direction of a faculty member. These programs share the premise that students will most likely become interested in an area if they have a chance to learn actively under the guidance of a person expert in and dedicated to the field. Some examples are the Biomedical Careers Program, the Access-Med Program, the McNair Program, the Douglass Project for Rutgers Women in Mathematics, Sciences, and Engineering, Project L/EARN of the Institute for Health, Health Care Policy, and Aging Research, and the Howard Hughes Programs in Newark and New Brunswick.

The Biomedical Careers Program is an eight-week summer enrichment program cosponsored by the Robert Wood Johnson Medical School. It is designed to assist minority and economically disadvantaged students interested in the health professions and biomedical sciences, and includes a research experience. More than 90% of program participants have earned bachelor's degrees; of these, more than half have gone on to advanced study in medical, dental, or graduate schools.

The Access-Med Program provides support for undergraduates with high potential for careers in medicine. Sixteen Access-Med participants have graduated from Rutgers, and 11 of them have been admitted to medical school.

The purpose of the McNair program is to prepare academically talented, first-generation, low-income, and traditionally underrepresented minority undergraduates to enter programs which lead to doctoral level degrees. The program provides participants with a comprehensive array of services including research internships, academic and career advising, tutoring, faculty mentoring, Graduate Record Examination preparation, graduate school admissions and financial aid counseling, and other special activities. Approximately 75% of students who have completed this program have enrolled in graduate school.

The Douglass Project for Rutgers Women in Math, Science, and Engineering was founded in 1986 to create a network of peer and faculty support for women students at Rutgers–New Brunswick. Over the years, the Douglass Project developed a number of different types of activities, including summer research internships, to achieve its goal of encouraging persistence of women in mathematics and science study. A recent evaluation of the project reported that when asked about the ways in which Douglass Project activities made a difference for them, students emphasized four major themes: (1) provision of information about educational and occupational opportunities; (2) provision of role models; (3) skills acquisition and other learning opportunities; and (4) a supportive environment. Seventy-eight % of the sample assessed in this evaluation persisted in mathematics, science or engineering majors, and 72% planned similar graduate degrees.

Many academic units recommend research-oriented internships to their undergraduates (e.g., the History and Political Science Program in New Brunswick and the Nursing and the Business Programs in

Newark). Two examples are the Public History Project of the New Brunswick history department and the Washington Internship of the political science department.

While many important undergraduate activities may not qualify as formal academic research as traditionally understood, they nonetheless have significant creative components. Examples of programs that engage students in creative activities are those of: the Mason Gross School of the Arts, where students and faculty launch numerous theatrical productions, concerts, dance performances, and art exhibitions; the landscape architecture department of Cook College, where students are assigned to design public-service projects, often at the specific request of public or private agencies; and Camden's Department of Art and Art History, which, through a comprehensive internship program, places students in creative activities at museums, galleries, and graphic design companies.

Future Directions

It is essential that additional work be done to further the integration of research and undergraduate education. A number of activities should take place in the future in order to further support this goal.

It is essential that all courses include discussion of the process of discovery used in the creation of the content of the course. The various disciplines should be presented to students in terms of the methodology they use to address new issues and solve problems, rather than only as sets of facts. The number of “capstone” seminars—which integrate previous learning, highlight the research process, link the discipline to the larger society, and emphasize future research issues to be addressed—should be increased.

In addition to learning about the research results, issues and processes in all classes, more students need to learn about research by doing research. The number of research opportunities for students should be expanded. The possibility of research internships in local corporate and government settings should be explored.

Additional mechanisms for recognition of undergraduate research efforts should be developed. At this time, annual undergraduate research conferences are in the planning stages in New Brunswick and Camden. Such events can raise the visibility of undergraduate research, provide a forum for interdisciplinary communication of undergraduate research findings, and celebrate the work resulting from collaboration between students and faculty members.

Finally, the Undergraduate Research Roundtables should be continued. These events provide a good source of faculty input on additional program development that is needed to support undergraduate research and creative activity. Such input is essential for effective program development.

INFORMATION AND COMPUTER LITERACY

Introduction

Information literacy is one of the essential goals of a college education. As defined in material prepared by the Rutgers University Libraries, information literacy is the ability to find information, evaluate it, and use it effectively. In today's global information environment, the ability to locate, analyze, synthesize, and use information is a skill critical to sorting through the massive amount of information available through new computer technologies and the expanding communication media. Information and computer literacy skills that prepare students to navigate effectively in a paper or electronic environment are interdisciplinary skills that can be applied to any field.

Rutgers has recognized the importance of being prepared for this global change. One of the university's learning goals specifically recommends that students develop skills in gathering, accessing, analyzing and interpreting information, in part through using the tools of modern computer technology. Cook College in New Brunswick has added computer literacy as a graduation requirement.

These are ambitious goals, given the vast resources required to keep up to date with changing technologies and the diverse skills with which our students enter the university. As our society continues its progress toward a division between the information-rich and information-poor, we can expect that more and more students will come to the university with increasingly high levels of skill in computer technology and information literacy. On the other hand, a large group of less fortunate students will also come to us in need of rudimentary training in order even to begin to compete in today's information society. Thus, our curriculum must be supported by a sophisticated, up-to-date computer infrastructure as well as by educators who are able to enhance the knowledge of students who come to us with a substantial technological background. In addition, we must be able to provide introductory training to students who lack basic technological skills.

Current Status

Perhaps the single most important factor for promoting information and computer literacy is the computing infrastructure of the university. Easy and convenient student access to computer systems is essential. Presently, all students can get computer accounts on the Rutgers network and can log in at several microcomputer laboratory locations throughout the university on all three campuses, or dial in from remote locations. The computer laboratories typically include a variety of hardware such as PCs, Macs, workstations with the UNIX system, laser printers, scanners, CD-ROMs, and other multimedia facilities. Software tools also are available, such as word processing programs, spreadsheet and graphics tools, access to the Internet and the Web, and specialized packages (e.g., computational, data analysis, database). Undergraduates routinely use these facilities in their everyday academic work. All undergraduate students are assessed a fee of \$50 each semester to help support this effort.

A recent survey of departments provided a picture of desired undergraduate computer literacy skills across disciplines and showed that by far the highest priority was for word processing, followed by specialized software packages for various disciplines, and then by library and database access programs, spreadsheets and graphics programs, email, introductory programming, data communications and networking, database management systems, and advanced programming.

Different academic programs, schools, and colleges across the three campuses follow a variety of approaches in realizing their goals of computer literacy. Many departments provide their own specialized courses and facilities. Others make use of existing computer literacy courses from the computer science departments. Still others use RUCS short courses and library seminars on specific computer-related and information-literacy topics.

Many initiatives dealing with issues of information and computer literacy are based in individual courses. In New Brunswick, for example, Computer Science 110, Introduction to Computers and Applications, serves a large number of students (approximately 1400 per semester) in all disciplines by providing basic instruction in the use of various software applications and programming. The needs of individual programs are addressed by special versions of the course (for example, CS 170 for business students) and by other, more advanced courses. Similar courses exist in Camden and Newark.

The Internet, World Wide Web, and other advanced computer technologies such as hypertext, CD-ROMs, multimedia, and “smart classrooms” are increasingly being used in the undergraduate curriculum. Currently about 60% of departments at Rutgers have a Web-based home page. Several departments routinely use the Web by maintaining course-related home pages, providing course materials, and interacting and communicating with students. Many individual instructors across the disciplines have organized listservers to give their undergraduate students the ability to exchange email with their classmates.

Libraries on all three campuses offer classes, tailored to specific courses and disciplines, that teach information literacy skills. Through the use of handouts, computer demonstrations, exercises and guided hands-on practice, librarians help students understand how information is organized, how to navigate electronic resources on the Internet, how to identify scholarly and popular periodicals, how to find government publications, and how to focus a topic. The new Scholarly Communication Center in Alexander Library on the New Brunswick campus is designed to provide a technologically rich environment for teaching, learning, and researching information access and information literacy.

To address the needs of remedial students, during the summer of 1995 the EOF Program in New Brunswick began to incorporate instruction based on research and theory from library and information studies in addition to its traditional emphasis on written communication. Instruction focused on the information search process. The Learning Resource Centers provide tutorial assistance to students in basic computer literacy courses. Each semester there are several RUCS and library short courses on various specialized topics, such as learning the basics of the UNIX system, the TeX typesetting system, and finding resources on the Internet.

Future Directions

As students consider college majors, graduate, and make career changes, those with information and computer literacy skills will be active participants in the marketplace of knowledge workers. They will be able to find the resources they need to make the best consumer, career and community decisions. We must find ways to ensure that all of our students are ready to meet the challenges ahead of them. This effort will require a substantial commitment of financial as well as faculty resources.

The university must provide the financial backing to enhance and maintain its electronic infrastructure. Rutgers faces a specific challenge because of its geographic dispersion. Enhanced electronic communication can help connect students, faculty and staff across the three campuses of the university.

Given the rapidly changing nature of computer technology and communication media, as well as the diverse skills and abilities of our students in terms of their technological sophistication, continued faculty training is imperative. Faculty must be prepared to use new technology to enhance instruction. The effective use of new media will be crucial to the delivery of education in the 21st century. As any instructor faced with navigating through one of the university’s “smart classrooms” will attest, however, developing these skills involves an enormous amount of faculty time and effort, as well as rethinking the basic educational strategy.

The university has begun to meet these challenges. Various support programs exist for improving information and computer literacy.

Rutgers Dialogues Grants, Undergraduate Curriculum Seed Grants, and Teaching Excellence Center Grants are given each year to enhance the undergraduate curriculum and teaching and, in particular, to

promote the use of information and computer technology. Some examples illustrate the breadth and scope of such grants.

Dialogue Grants

- CommuniStation: Multimedia Support for Large Class Learning
- Data Handling in the Molecular Biosciences
- Computer Proficiency Assessment in MIS Undergraduate Education
- Computer Laboratory for Psychology Undergraduate Curriculum
- Scientific Inquiry in Business Research
- Distributed Library Instruction on the WWW
- Computer-Aided Instruction in Introductory Biology

Teaching Excellence Center Grants

- Development of Computer-Controlled Multimedia Materials in Music
- Computer Lecture Presentations in Introductory Economics
- WWW Server for the Visual Arts
- Computer-Generated Displays in Cognitive Science
- Multimedia Tools, Interactive Software, and Videotapes in Physics
- Computers in Health Research
- Tutor in Pharmaceutical Calculations
- Revising the Culture of Undergraduate Research at Rutgers: A Collaborative Project between the Writing Program and the Rutgers Libraries for Providing Excellence in Writing across the Disciplines.

Such grant programs should continue to support curricular initiatives that build basic information and technology skills, as well as discipline-specific advances in technology use.

The Teaching Excellence Centers in New Brunswick, Camden, and Newark also provide a variety of workshops and consulting services to assist faculty members in their efforts to develop information and computer literacy in our students. The Lilly Teaching Fellows Program run by the New Brunswick Teaching Excellence Center has been an especially effective means of building a cadre of young faculty members to lead the way in incorporating use of computer and information technology as well as other instructional technology in classes. Faculty development is essential to ensure appropriate integration of these areas in the curriculum.

Supported by a Dialogues Grant, a new minor in computer, information and communication literacy is being developed. Its purpose is to promote the development of several interdisciplinary literacy skills that together define a well-educated person. A high degree of student interest exists in this minor. Strong interest also exists in Internet and WWW technologies. A certificate program in Internet technology has recently been approved for computer science majors. Development of this program has been supported through the first SROA allocation cycle. Currently, there is no similar program for other majors. A preliminary attempt in this direction is the computer science course, Introduction to Network Applications, which was offered on an experimental basis in 1995 and was funded by a Dialogues Grant. Course sequences related to information and computer technology would be relevant for students in a variety of majors and should continue to be considered for development.

The library is a primary supporter of information literacy for undergraduate students. It must provide a primary information environment as well as the support services needed to educate students to access and

utilize a variety of information resources. Support must increase if our students are to receive the training that they need to succeed in an information-based society.

The *University Strategic Plan* recognizes the importance of information and computing technologies for the success of undergraduate education in the future. The RUNet 2000 project, strongly endorsed by the *Strategic Plan*, will establish a high-speed communications network linking all offices, classrooms, libraries and dormitories. All students, faculty, staff, and administrators will have easy access to computer and information resources. The rapid development of new computer and information technologies will require the university to be ready to evolve and adapt quickly to these advances. Funding to network the university as well as for continuous upgrading of hardware and software and for faculty training and development will be essential.

MULTICULTURAL UNDERSTANDING

Introduction

The commitment of Rutgers University to academic and extracurricular support of multicultural understanding for undergraduate students is marked at once by a profound respect for past accomplishments and a determination to continue to move forward. Indeed, as President Lawrence observed in 1995, in the university's *Multicultural Student Life Recommendations*, "Our record is exemplary, but our agenda is far from complete." Acknowledging the importance of institutional memory on matters involving race relations and racial justice, equal access to resources for all members of the university community, and cultural understanding, Rutgers has sustained and expanded many of the multicultural programs that were hammered out during the tumultuous late 1960s and early 1970s. Equally important, the university also addresses cultural subjects that are seemingly new and far more complicated than those of the past, including transgender and intergenerational identity. Because these and other cultural issues resonate in the larger society at a time of heightened self-awareness by students and of cultural discord around the world, Rutgers recognizes the vital importance of intercultural harmony and understanding to the well being of its students.

The success of efforts to promote cultural diversity and encourage understanding of cultural differences and affinities is reflected most prominently in the demography of the student body. Rutgers compares favorably with other public research universities, ranking fourth in the percentage of total minority enrollment. It ranks second in the percentage of African-American enrollment. Rutgers is considered by *Hispanic Magazine* (1996) to be among the top 25 colleges nationally for Hispanic students. This mirrors a dramatic transformation in the demography and cultural life of the university. There are now more minority students at Rutgers than any other college or university in New Jersey.

The demographic transformation of the university community is buttressed by significant reforms designed to improve the cultural climate of all campuses. Old and new challenges to intercultural understanding and interaction have been consistently addressed since 1987 by the Committee to Advance Our Common Purposes. Its mission is to provide a university-wide forum for an ongoing dialogue about intercultural relations at Rutgers. As President Lawrence observed in 1995, the committee "has been a powerful vehicle for involving the entire university community in celebrating our diversity." The Paul Robeson Cultural Center and the Center for Latino Arts and Culture have provided a range of outstanding cultural programs that have increased multicultural knowledge and understanding within the university and in the larger community. The Paul Robeson Centennial planned for 1998 promises to offer a spectacular array of exhibitions and performances related to the life and beliefs of this outstanding Rutgers graduate.

Multicultural Blueprint

The university community has responded to President Lawrence's call for systematic planning for multicultural student life, specifically with a series of campus Blue Prints on Multiculturalism. Submitted to the president during spring 1996, each campus blueprint highlighted the intercultural issues facing its students, areas where improvements in cultural interaction and discourse were needed, and specific campus initiatives designed to strengthen cultural understanding. At the same time, each blueprint persuasively argued that civility, cultural literacy, and a reverence for open cultural discourse were at the center of undergraduate student life.

The New Brunswick Campus Blueprint, for example, highlighted an array of special and ongoing initiatives designed to enhance intercultural understanding and foster harmonious relations within the campus community. These included academic and extracurricular programs mounted by the Paul Robeson Cultural Center, the Center for Latino Arts and Culture, the CASE program, the Mason Gross School of the Arts, Summer Fest, Latin Images, the Institute for Research on Women, and the Bloustein School of Planning and Public Policy, among others. Moreover, New Brunswick campuses envisioned a greater effort in multicultural orientation for incoming students, aggressive attempts to hire more minority faculty, the mounting of conferences, symposia, and other events with multicultural themes for students, faculty, and the larger community. The New Brunswick Blueprint also highlighted several nationally significant programs for undergraduate students, perhaps most notably the Office of Minority Undergraduate Sciences Program. The Teaching Excellence Center in New Brunswick has supported the goals of improving multicultural understanding by sponsoring a variety of seminars for faculty related to dealing with diverse learning styles.

The Newark campus, which for nearly a generation has been the most ethnically diverse of all Rutgers campuses, submitted a blueprint for new orientation programs which seek to integrate multicultural initiatives in virtually every aspect of campus life, with particular emphasis on incoming student orientation. The campus launched new standing committees to oversee implementation of specific features of the university's Multicultural Blueprint, including the reduction of classroom bias and discrimination, the expansion of opportunities for multicultural student life, the promotion of multicultural conferences and symposia, and the improvement of the campus infrastructure. The Teaching Excellence Center on the Newark campus reported that more than one third of its programs are devoted to issues of diversity and multiculturalism, and other academic centers have made campus civility and cultural sensitivity important features of their daily activities. Among the more recent developments at the Newark Campus is the establishment of the Rutgers Institute on Ethnicity, Culture, and the Modern Experience. The Institute will serve as a hub for scholarly discourse on the construction of ethnic, racial, and group identity, and will marshal the considerable resources of the university faculty toward service in the public sphere. This Institute was endorsed by the *Strategic Plan* and received seed funding in the first round of SROA allocations.

On the Camden campus over 60 countries of national origin are represented within the student body. Its Multicultural Blueprint called for the formation of a 30-member Multicultural Student Life Committee to oversee the implementation of orientation programs for new students, the improvement of interethnic communication, the reduction of classroom bias and discrimination, the improvement of communication concerning multicultural events on campus, and the encouragement of teaching methods that enhance the academic performance of culturally diverse students. Like other campuses, Camden modified the programming at its Teaching Excellence Center to address ways of assisting the faculty in fostering a

greater sense of community on campus. It also generated considerable enthusiasm in 1995 for the Stedman Art Gallery's exhibition "Louis Armstrong: A Cultural Legacy." Over the next two years, the Office of Student Life sponsored a diversity retreat for 50 students, sponsored off-campus tours to arts venues, and helped to mount annual observances of Black History Month, Women's History Month, and Latin American Heritage Month. Plans were also made to increase minority enrollment and strengthen precollege programs.

Conclusions

Rutgers offers its students a wide range of courses and cocurricular activities related to multiculturalism. Many departments and programs—such as African studies, Afro-American studies, women's studies, Puerto Rican and Hispanic Caribbean studies, Latin American studies, and Jewish studies, among others—help students gain knowledge of the diversity that exists within our society. The undergraduate colleges require that students sample some of the hundreds of course offerings related to non-Western culture. Still, we have additional work to do. Our efforts at providing our students with information about the diversity that exists within American society have been commendable, but these efforts need additional focus on the issues of how diverse groups interact within our society to form a new kind of community, the problems that have resulted from these interactions, and the potential solutions to these problems. We must focus on moving from celebrating diversity to critically engaging diversity. We must work to ensure that courses across the curriculum provide students with the opportunity to understand the interactions of the multiplicity of groups that are part of our nation, and that our teaching creates an environment which is affirming for all students, but is also one where students can question, disagree, and discuss contradictions and conflicting points of view.

Rutgers University, not unlike other major institutions in our society, has been tested by the swift winds of cultural change since its beginning, but perhaps never as much as since the late 1960s. The Campus Blueprints brought to light an impressive array of conscientious attempts to acknowledge and celebrate cultural knowledge and interaction as positive features of a great public university's life. All the more, the university's enduring commitment to multicultural harmony, curiosity, and interaction serves as an example for other institutions of higher learning to follow.

INTERNATIONAL PERSPECTIVES

Introduction

A global perspective is the recognition that we live in an interdependent and multicultural world. Global education provides students with the knowledge and skills that allow them to understand and to prosper in this world. In particular, it gives them a working familiarity with a diversity of societies and civilizations as well as an appreciation of their social, political, economic, cultural, and ecological interconnectedness. Our goal at Rutgers is to provide students with a global perspective while positioning the university as a leader in international education and research. Our students need a global education if they are to become wise leaders and responsible citizens of the 21st century.

Revolutionary improvements in communication and transportation have made the world interconnected and interdependent to a degree that was hard to imagine even a decade ago. We must enable our students to participate in this world. We must give students a working familiarity with a diversity of societies and civilizations as well as an appreciation of their social, political, economic, cultural and ecological interconnectedness.

Current Status

We have many of the ingredients necessary to initiate a university-wide program which offers this “perspective” to all undergraduates. The remarkable diversity of Rutgers students, faculties, and curricula manifests itself in a number of important regionally and internationally oriented programs on each campus and within the collegiate, departmental, and program units of each campus. The Newark Center for Global Change and Governance (directed by Richard Langhorne) coordinates a wide array of global programs in Newark. The Center for Central, Russian and East European Studies (directed by Joanna Regulaska) and the Center for Latin American Studies (directed by Tomas Eloy Martinez)—as well as programs in East Asian studies, Middle Eastern studies, and African studies, among others—highlight active and visible programs in New Brunswick. Similarly, Camden’s recent efforts in Southern Africa offer the promise of significant undergraduate opportunity. All of this, capped with the recent success of the university and its African studies specialists in bringing the national African Studies Association to Rutgers, signals great potential at each campus.

At present, however, our impressive individual strengths present an offering that is less than the sum of its parts. Our challenge is to coordinate and expand these offerings in a way that will more clearly reflect our diverse strengths, and begin to take advantage of them with better-focused curricular and cocurricular programs. We must develop a better organizational sense of what we currently have available across all three campuses and be prepared to make substantial strategic investments in the development of international programs. The challenge is extraordinary; but the payoff is potentially enormous, both for the recruitment of students and for the better preparation of all of our students for the 21st century. New Jersey’s increasingly diverse citizenry and its remarkable, internationally engaged corporate giants demand that we address the realities of our current situation and prepare for the near and more distant future.

We are moving forward, developing existing strengths and building new programs consistent with the *International Studies Strategic Planning Implementation Report* and with separate initiatives that continue to emerge. The university has established a Global Studies Board responsible for the development of global initiatives at the university. A Center for Global Issues and International Programs (CGIIP) has been created at New Brunswick, beginning its work with a working proposal to promote the “internationalization” of existing majors in the Faculty of Arts and Sciences and other interested decanal units. The existing Center for Global Change and Governance at Newark has begun its work on the graduate level, and will help to coordinate existing undergraduate offerings in international studies and— it is hoped—to promote more. Similarly, the projected Center for Global Awareness at Camden will be charged with the development and coordination of its undergraduate programs. Each of these centers is charged with nourishing global initiatives and programs outside the center itself. The strategy, again, is to develop the considerable current strengths of our existing departments, programs, and centers, and to encourage joint initiatives among them, with the goal of disseminating a global perspective throughout the university.

The global centers are to develop strategies and to provide incentives for academic units at all three campuses. The incentives include financial resources for speakers, conferences, new courses, international visitors, “study abroad” scholarships, grant development, and undergraduate research. The clear understanding is that—despite our existing strengths—expansion and coordination of global programs will require a substantial investment of new resources.

Existing programs on each campus and across the collegiate and programmatic units of each are far too numerous to enumerate, let alone to describe in detail. There are, however, some important examples on each campus that should be noted.

The Newark campus has a long tradition of undergraduate education in international studies. Its minor in international affairs is interdisciplinary, requiring the successful completion of a foreign language through the intermediate level and an introductory course in comparative politics for all in the minor. Twenty-one additional credits may then be taken from a variety of courses in comparative literature, economics, business and political science. Study abroad is recommended. In addition, individual departments offer myriad relevant courses.

The Camden campus, likewise, offers a number of departmentally based courses and programs in its Arts and Sciences Faculty. The Center for International Business involves undergraduates in its programs and provides a critical focus for campus-wide activities. Its B.S. degree offers undergraduates the full range of a globally oriented curriculum, including the special foci needed to train students for and sensitize them to the needs and opportunities available in the emerging global economy. The new Council of Southern Africa fosters exchange programs of importance to both undergraduate students and faculty, and will become a center of international activity on the campus.

FAS–New Brunswick is developing an undergraduate curriculum, beginning with FAS departments, which seeks to offer more diversity and flexibility than similar programs at other universities. Students accepted into the program will add “global studies” to an existing major, e.g. history/global studies, political science/global studies or Spanish/global studies. All global studies students will be expected to have competence in a second language relevant to their academic studies and will be required to have an international “experience” (e.g. study abroad or a CASE internship). As with the other campuses this new program builds on existing resources. New Brunswick currently has significant course offerings and majors in Russian, Central and East European studies, Latin American studies, African studies, Puerto Rican and Hispanic Caribbean studies, Middle Eastern studies and Asian studies, among others. Moreover, each of these regional programs has fashioned its curriculum largely out of courses that have long been taught in FAS departments. The coordination and development of these programs and the development of campus-wide global studies majors will extend as well into already developed programs at Cook College, the School of Communications and Library Sciences, and the School of Business.

In order to enrich the global curriculum at the three campuses, qualified students at one campus will be encouraged to enroll in area-study courses and advanced language and literature courses at another campus, either in person or via distance learning. In this spirit, the university will additionally seek to make language instruction more broadly available to students, in order to prepare them for their major course work and research as well as for travel to non-English-speaking parts of the world. Thus, an enhanced capacity to offer language instruction on each campus is clearly necessary. Global education is superficial if it is not accompanied by language proficiency. To meet this need, each campus will establish language institutes that will include multimedia language laboratories and classrooms. These will provide support for existing language programs; provide the opportunity to offer instruction in languages not currently available; and offer different sorts of instruction—including intensive language courses, continuing education courses, and short, specially designed courses for both the Rutgers undergraduate community and the broader Rutgers and New Jersey communities.

Future Directions

In sum, many of the pieces necessary for addressing global/international education in a comprehensive manner at the undergraduate level are in place at Rutgers. We must, however, proceed to coordinate our existing faculty, courses, and programs, and to innovate and expand in some areas. A number of areas need to be addressed in order to strengthen the provision of international perspectives in the undergraduate curriculum.

First, individual faculty members and departments must take responsibility for ensuring that international perspectives are represented in the teaching of all disciplines. It is essential that the interdependent nature of our world as well as international scholarly processes and contributions be represented in the curriculum content of all majors.

It is important that the opportunity for language study be expanded. Such study will provide our students with a greater understanding of the multidimensional nature of the global society, and in many cases with a practical means of improving their ability to navigate in this society. The proposed language institutes will provide excellent vehicles for doing this. The first round of SROA allocations supported development of a Language Institute in New Brunswick. This will replace existing language labs with state-of-the-art learning facilities, including multimedia language labs and classrooms. This new unit will offer a much greater range of languages in a much greater range of formats—such as intensive, continuing education, short-courses, self-paced instruction. The institute will support the needs of developing global initiatives at the university.

Study abroad must be expanded in order to provide more students with an international learning experience. The expansion should take a number of forms. It is essential that such programs include a greater number of students and a greater diversity of students. In order to accomplish Vice President for Undergraduate E some students will need additional financial support. In addition, more alternatives to the traditional semester abroad should be developed in order to provide students with learning opportunities that are less costly and have shorter time frames. “Study abroad” locations currently include Italy, England, France, Israel, and new programs are emerging in India and South Africa. The diversity of “study abroad” locations should be expanded to reflect the truly global nature of our society. Finally, in order to provide students with a learning experience in which they can become immersed in an international culture, more experiential “study abroad” options should be developed—such as service learning (CASE) abroad, international research internships abroad, and corporate internships abroad.

Additional funding will be needed for many of these initiatives. The various centers on the campuses and the university-wide Global Studies Board can act as catalysts for such development. The first round of SROA allocations has provided initial funds to enhance global and international programs. Support has been provided for the Center for Global Change and Governance–Newark, Global Programs–New Brunswick, and the Office for Global and International Programs–Camden. The upcoming capital campaign should be a source of support for many of these additional needs.

CITIZENSHIP EDUCATION

Introduction

The charter that established Queen’s College in 1766 defined the new institution’s mission as promoting “learning for the benefit of the community,” a mission that still defines Rutgers’ primary purpose. At Rutgers, concern about education for community and citizenship—whether for United States nationals or for immigrants and visitors—is embedded in broader concerns about how a public research university not only adapts to America’s rapidly changing needs, but takes a lead in shaping the future. As educators who care for our students, for Rutgers, and for the state and country we serve, we recognize the challenge we must meet if higher education is to serve this nation well in the 21st century. Specifically,

- We are concerned about the collapse of community in America, the erosion of a sense of citizenship, and the alienation of young people from politics and from their communities.
- We are concerned that universities, including Rutgers, need to be better connected to their host communities, and to share their resources better with their neighbors.
- We are concerned that we must teach our students not merely the substance of the traditional curriculum but also the connection of that curriculum to the larger society—for example, by teaching the interpersonal skills needed to function in increasingly team-oriented work places, in an increasingly multicultural America, and in an America that is part of the world and the world economy as never before.

These challenges are real, important, and unavoidable. How has Rutgers responded?

At Rutgers we believe that citizenship education plays a key part in fulfilling our research, teaching, and service missions. Numerous curricular and cocurricular programs offer students the opportunity to learn the skills they need to be good citizens, and actually to be good citizens of the Rutgers and neighboring communities. Rutgers’ many professional schools make service central to their mission statements; the many student Governing Associations are incubators of democratic leaders; the multipurpose college honors programs and the many honors societies require service; and all fraternities and sororities as well as dozens of student organizations—from the Asian Children’s Charity Association and Circle K, to Twese, the African Students Association and the Vietnamese Students Association—make community service integral to their activities. The centerpiece of our efforts, however, is the university-wide, curriculum-based Citizenship and Service Education (CASE) Program.

Curricular and Cocurricular Programming: An Overview

Rutgers offers students a dizzying array of citizenship education options. The university’s vice president for student affairs, as well as the deans of student affairs in Camden and Newark and at the various colleges in New Brunswick, assist the student governing associations and provide a variety of leadership training programs to support students as “citizens” of their college and university communities. (Students are included in governance up to the highest level, including representation on the university Senate and representation on the Board of Governors and Board of Trustees.) The athletics department offers the Rutgers University Read Aloud Program (RU RAPS), through which student athletes participate in literacy programs with more than 3,000 area youths annually. Similarly, “Neighborhood Relations” and “Adopt-a-Neighbor” connect hundreds of Rutgers students with older citizens to provide companionship and assistance. Every term students in fraternities and sororities from across Rutgers provide thousands of hours of community service and raise thousands of dollars for charity. Various student organizations

undertake specific community service projects too numerous to detail. The Asian Children's Charity Association, for example, raises more than \$12,000 every year to support orphans, while Community Service House, a 40-bed special-interest residence hall in New Brunswick, annually organizes RU Making a Difference Day, a joint New Brunswick–Rutgers celebration of service, which last year won Community Service House a Saturn Corporation National Service Award.

An equally wide variety of curricular programs provides students the opportunity to serve in the community. In Camden, Project LEAP (directed by Gloria Bonilla-Santiago from the School of Social Work, and funded by HUD) is creating an innovative inner-city charter school. Similarly, the New Brunswick Urban Ecology Program (directed by Michael Hamm from the Cook College Department of Nutritional Sciences) involves Cook students in environmental, gardening, educational, and nutrition programs at housing projects around New Brunswick. In Newark, students of Patricia Greene and D.T. Ogilvie from the School of Management and the Rutgers Center for Entrepreneurial Management are involved in the Initiative for a Competitive Inner City (ICIC), founded by Harvard Professor Michael Porter, providing consultative services to inner-city entrepreneurs and such community-based organizations as the Greater Newark Merchants Association.

The Citizenship and Service Education (CASE) Program

CASE began in 1988 with a call to action by the then president of Rutgers, Edward Bloustein: “I propose that we look at community service as a necessary component of the learning experiences which constitute a liberal education.” The Board of Governors embraced the idea, and called for a Rutgers dedicated to teaching the fundamentals of citizenship, a lifelong service ethic, an understanding that diversity is the source of our strength, and the academic and social skills needed to thrive in modern America. With the support of President Francis Lawrence, CASE has been institutionalized in the Office of the Vice President for Undergraduate Education, and today is a vital part of the Rutgers undergraduate curriculum.

CASE is built on a philosophy of active learning and a belief that citizenship cannot be learned from books, but must be learned by doing. CASE courses, therefore, combine a three-credit classroom course with a one-credit service-learning placement related to the subject. CASE courses require students: to do 40 hours of community service; to confront the human realities behind the abstract materials they are studying in the classroom; to think about, discuss and practice good citizenship; and to forge a link between service and learning, and between the classroom and the real world. CASE does not preach a specific citizenship “ideology,” but rather defines citizenship as practice, as taking an active part in the life of one's community. Moreover, given our desire to teach students that the private skills they are learning in the classroom have critical social utility, CASE insists that students' service placement be directly related to what they are learning in the classroom, such that in different courses, departments and professional schools “citizenship education” may have the same basic form, but a very different flavor. Thus, for example, Camden students in “Urban Studies: What Every Citizen Should Know About Planning” work with city agencies or neighborhood groups on empowerment zone plans; New Brunswick French students in “West African and Caribbean Literature” run an elementary school French language and culture program at the Lord Stirling Middle School; while in Newark undergraduate business majors in “Business Policy and Strategy” work as consulting teams with Newark city agencies.

From a small, still experimental program in 1993—when President Clinton came to Rutgers to announce his national service plan and to recognize CASE as a model for the country—CASE has grown dramatically. Full-service CASE programs operate on the New Brunswick and Camden campuses, and one

is being established on the Newark campus with a grant of \$125,000 from the Prudential Foundation. CASE also provides nine-credit Summer Session certificates, and offers international service programs in Costa Rica, Poland and South Africa. In just three years, annual CASE enrollments have jumped from fewer than 300 to 2,500, CASE course offerings have jumped from 14 to 75, CASE students' annual community service contribution has jumped from 12,000 to 125,000 hours, and the CASE placements book has grown from 15 to 330 pages of job listings.

| | 1989–94 | 1994–95 | 1995–96 |
|---|-----------|-----------|-----------|
| CASE courses taught | 125 | 34 | 70 |
| Number students enrolled | 3600 | 819 | 2040 |
| Number of departments, colleges, professional schools participating | N/A | 7 | 23 |
| Hours community service offered | 90000 | 57080 | 126650 |
| Value at minimum wage (\$5.25) | \$472,500 | \$299,670 | \$664,913 |
| Community partners served | N/A | 57 | 225 |

CASE also provides technical assistance to service-learning programs across the country and around the world. In 1995–96, CASE staff assisted service-learning programs at 53 colleges and universities from 17 states and 5 foreign countries, provided 1,684 packets of program materials to other schools, hosted delegations from 7 universities, and made 17 consulting visits to universities in 5 states and 4 foreign countries.

Future Directions

Though CASE's 1995–96 enrollment of 2,000 students is impressive, it represents less than 10% of Rutgers' 28,000 full-time undergraduates. If enrollments continue at this level, the likelihood that any given student will have taken at least one CASE course by graduation is roughly 25%. We would like to see annual enrollments increased to 4,200 or 15% of full-time undergraduates, such that the likelihood that any given student will have taken at least one CASE course by graduation is 45%. To achieve this, CASE must pursue initiatives that: (1) articulate with the *University's Strategic Plan* (e.g., global studies); and/or (2) support community-identified needs (e.g., TV courses to meet agencies' need for publicity); and/or (3) support curricular innovation by colleges, departments and professional schools (e.g., the CASE-Department of Computer Science–SCILS Center for Electronic Communities and Commerce); and/or (4) otherwise support the university's service mission (e.g., the Zimmerli's docents program).

As curricular and cocurricular citizenship education programs develop, support services such as training and supervision must develop as well. Rutgers must ensure that students involved in service are properly prepared for safe placements at properly vetted sites, while Rutgers owes it to the community to ensure that students are well trained and responsible.

Citizenship education must deliver what it promises at an acceptable cost in terms of other demands on the university budget. In order better to assess learning outcomes, and program and cost effectiveness, Rutgers must develop appropriate evaluation instruments. At present, CASE systematically assesses: (1) program performance using a series of special CASE questions included on the standard Teaching Excellence Center student evaluation forms completed by all students at term's end; (2) CASE office

performance using focus groups of Community Partners, faculty, university administrators and students; and (3) cost effectiveness by comparing the cost per enrolled CASE student to the national average cost as calculated by “Campus Compact.” Similar assessment/accountability measures should be developed for other curricular and cocurricular citizenship education programs receiving university funding, and the CASE program should expand its assessment of student outcomes.

In sum, we are proud of our successes in this area. While we recognize that there is always more to do, we believe that we have made great strides in making citizenship education and a service-ethic part and parcel of the education Rutgers students receive in the classroom and in their many other cocurricular activities.

SPECIAL ISSUES FOR PROFESSIONAL EDUCATION AND ITS RELATION TO LIBERAL ARTS

As the state university, Rutgers embraces professional education as an important element of its undergraduate program constellation. The university has Schools of Business on all three campuses, a College of Nursing operating on two campuses, a College of Pharmacy, a College of Engineering, the Edward J. Bloustein School of Planning and Public Policy, the Mason Gross School of the Arts, Cook College, the School of Communication, Information and Library Studies, the School of Social Work, and the Graduate School of Education offering baccalaureate education. Additionally the Colleges of Arts and Sciences, particularly on the Newark and Camden campuses, house several majors that are equally professional in character. The Education programs in Camden and Newark, for example, prepare primary and secondary school teachers who must take the National Teacher Examination to qualify. Undergraduate majors in social work given in the Newark and Camden Colleges of Arts and Sciences are accredited by the Council on Social Work Education. Medical Technology programs offered by Douglass and Camden prepare students for certification by several professional boards. Camden offers a major in nursing accredited by the National League for Nursing. The chemistry departments advertise their degrees as accredited by the American Chemical Society, and Cook College offers accredited programs in dietetics, landscape architecture, and bioresource engineering.

As at most institutions with professional programs, a tension exists among faculty over the breadth of their curricular requirements. Some faculty feel the focused nature of professional education deprives students of a unique opportunity; that education during these formative years should be as broad as possible. Others view the standards of the professional licensing and accrediting associations as a template for structuring their programs. We gain some perspective on this influence from the comments of a representative of the College of Pharmacy.

Pharmacists require licensure in order to practice. The national licensure examinations that are administered to pharmacists are extremely rigorous. A significant portion of our curriculum needs to address the skills and competencies that are assessed in the licensure exam, otherwise our graduates would not be able to pass them. In addition, in order for the college to qualify for professional accreditation, the performance of our students on licensure exams is taken into account.

The principal academic challenges arise as the faculty struggles to achieve a balance between these two compelling positions at the baccalaureate level. The professional schools must guarantee the competence of the profession, while at the same time providing an education for students that is broad enough to produce an individual who can also participate effectively in politics and culture, and in nonprofessional intellectual issues.

In considering the issue, we envision a continuum along which may be measured the extent of program specialization. Without a doubt many of the most structured programs are those offered by the professional schools. However, the 70 credits required by an applied physics program in a College of Arts and Sciences doubtless ranks near the top as well. The issues of professional education and its relationship to the liberal arts are by no means confined to the professional schools.

Earlier we described the Rutgers Dialogues—a university-wide undertaking to establish a set of broad learning goals to be shared by all programs. While the faculty of professional programs strive to develop curricula which meet the missions of their schools as well as the mandates of accrediting/licensing boards, they also must conform to the goals that emerged from that process.

Professional programs achieve these learning goals by three means:

(1) **Distribution Requirements.** Each curriculum encompasses significant liberal arts distribution requirements, thereby assuring at least a minimal breadth in traditional arts and sciences subject areas. For example, business and nursing students at Rutgers are required to complete at least 60 credits of liberal arts subjects distributed across English composition, literature, history, mathematics, social science, humanities, fine arts, languages and laboratory science. Pharmacy students take at least 30 credits in humanities and social science electives. Schools report that their accreditation standards require proficiency in many of the areas defined by the Dialogues goals.

(2) **Course Content.** The professional program course content itself may specifically address one or more areas covered by the learning goals. For example, professional curricula frequently include courses specific to statistical analysis, computers, and information systems, ethics, law, group dynamics—all areas relevant to the Dialogues goals.

(3) **Teaching Method.** The teaching method employed in a program may reinforce the Dialogues goals. These may include the use of case methods, role playing, simulations, student team activities, active learning techniques, oral and written work-ups and presentation of case material, and externship and internship experiences.

Several professional schools meet their students' needs by offering five-year program formats. There is an option for students to complete three years toward the bachelor's degree in the arts and sciences and transfer to the Graduate School of Management to earn the M.B.A. The School of Criminal Justice, Graduate School of Education, and School of Social Work have similar opportunities where selected students transfer undergraduate credits and combine them with graduate training to earn a master's degree in the profession. Five-year dual undergraduate degree programs are offered by the College of Engineering, whereby a student completing two years in one of the Colleges of Arts and Sciences can transfer to the College of Engineering for three more. Both pharmacy and accounting require five years in residence. In each of these instances we see the tension between general and specific course work resolved by relaxing the four-year expectation.

Professional education, whether done under the auspices of a professional school or of a department in a liberal arts college, is at the interface between the educational establishment and an interested constituency from the professions they serve. At the Faculty of Management, for example, this relationship with the practitioner world is characterized as a “partnership in learning.” An advisory board made up of representatives of major corporations in New Jersey meets periodically with faculty and administrators to exchange viewpoints on relevant professional and educational issues. Similar relationships exist throughout Rutgers professional programs. The College of Nursing received a grant from the Robert Wood Johnson Foundation called “Colleagues in Caring: the New Jersey Collaborative,” whereby nursing faculty work with six other health-care agencies in the state to define how the nursing work force will meet the demands arising from changes in the health-care system. These relationships are deemed essential vehicles for program input to the faculty and are encouraged at all levels of the institution.

Because of the need to guarantee the competence of the profession, all academic units providing professional training must pay special attention to a number of issues. First, in all professions there has been an explosion of knowledge and an expansion of technical capability. It is essential that these new developments be incorporated in professional training and that the curriculum be continuously updated. Because of this rapid knowledge and technological change in the professions, the value of lifelong learning must be instilled in undergraduate professional students. Undergraduate education can provide the foundation for effective professional functioning, but this foundation must be continuously updated to incorporate new professional developments. In addition to the development of students’ technical knowledge and skill base, all professional education should address the issues of professional values and ethical standards of conduct within the profession.

In accepting the mission of creating competent professionals, the professional units have a special responsibility in the area of assessment. It is essential that they work to define competence, to develop ways of measuring competence, and to use those methods to evaluate professional competence in their students.

The success of the graduates of these programs in gaining employment, and—where required—in achieving licenses to practice, has earned them a strong constituency among New Jersey employers. Six of ten the highest scores on the C.P.A. exam in New Jersey last year were achieved by graduates of the School of Business in New Brunswick. College of Nursing graduates work in the major hospital complexes and increasingly in visiting nurse services as health care shifts to the home. Our education program students are in high demand in the school districts of New Jersey. Graduates of our social work and nutrition programs also enjoy strong institutional demand for their skills. The task of integrating technical knowledge, practical knowledge, and liberal learning is a difficult one. However, this integration is essential if graduates are to be competent and successful not only in their professions but also in other aspects of their lives.

ACADEMIC SUPPORT AND ENRICHMENT FOR A BROAD RANGE OF STUDENTS

PRECOLLEGE PROGRAMS

Introduction

Researchers and practitioners across the nation define higher education precollege programs as planned sequences of academic and related activities, sustained over time, and intended to enhance the preparation of noncollege students for admission and retention in higher education. While colleges and universities have traditionally provided limited precollege opportunities to noncollege students, precollege programs as they are defined here began in the mid-1960s with the federal government's "great society" initiative.

Rutgers University has a long history of offering precollege opportunities to students. Rutgers initiated precollege programs on a relatively large scale in 1969 with the advent of the Rutgers Education Action Program (REAP) on the New Brunswick campus. REAP focused its efforts on building strong collaborations with the public schools and reaching out to access student populations which were underrepresented in higher education, such as minority and women students. Under the REAP program, Rutgers–New Brunswick was awarded a federal grant to operate Upward Bound, which served as REAP's cornerstone program and is still in existence on the Rutgers–New Brunswick campus. Other precollege programs at the university served more general, but academically talented populations and evolved over time as Rutgers University campuses expanded. University faculty are extensively involved in numerous "precollege services" under the rubric of community service activities. These services and projects are varied and engage a significant amount of faculty time and energy, but they differ from the "precollege programs" defined above because "precollege programs" are specifically focused on preparing noncollege youth for higher education.

Past and current precollege programs have varied in the populations they serve and their focus, but all of them appear to be based on a number of important underlying assumptions. One assumption is that colleges and universities have valuable resources that can be used to benefit noncollege populations. Another is that academically talented students can benefit from selected precollege, university-managed activities. A third assumption is that colleges and universities need to engage in special efforts to access, prepare, and assist student populations that are traditionally underrepresented in higher education.

Current Status of Precollege Programs

According to the most current data, Rutgers University operates 28 precollege programs on three campuses which serve a range of precollege populations. All of the current programs serve students above grade seven, and most of them are specifically focused on high school grade levels. The one exception is the Transition Program for Adults at University College–New Brunswick. Nearly all of the programs serve minority and female students; only a few are exclusively targeted to one or both of these populations. Only 5 (18%) of the 28 programs specifically target low-income students, but all of the programs are open to low-income students, and 21 (75%) serve low-income students as a result of the nature of the schools and communities in which they recruit participants. Precollege programs at Rutgers serve a diverse youth population.

Most Rutgers precollege programs—24 (86%) of 28—have an academic focus. Most of the current programs are in partnerships or collaborations with public schools, and a few have multiple collaborations with specific nonuniversity agencies or organizations.

Following are descriptions of some of the many precollege programs that deserve special mention.

The Rutgers Upward Bound Program is a year-round program with a residential summer component that prepares low-income high school students for admission to college. The program serves 100 students each year from the communities of New Brunswick, Perth Amboy, and Plainfield. During the summer, students spend six weeks attending classes, and receive academic, college admissions, financial aid, and personal counseling. During the academic year, students return to campus on selected Saturdays for instructional, tutoring, and counseling activities. Upward Bound staff make weekly visits to the participating high schools. Assessment information from this program shows that 95% of Upward Bound Program graduates (1990–1994) enrolled in college. To date, the average retention rate for this group is 82%.

The Waksman Student Scholars Program is a year-round program with a summer residential component that provides students with an intensive experience in genuine scientific research. The program serves students from 18 high schools state-wide. The students receive guidance and coaching from their teachers and members of the scientific community affiliated with the program. During the summer, students spend four weeks working cooperatively on solving meaningful, unsolved scientific problems. During the academic year, students return to campus on selected Saturdays to work on their projects and frequently communicate electronically with each other and their scientific advisors.

The Saturday Academy in Newark is a nonresidential, academic-year program that prepares minority students for entrance into college by providing intense SAT preparation and counseling. The program serves eleventh- and twelfth-grade students in the Newark public schools. Students participate in the program for 18 weeks, divided between the spring semester of the junior year and the fall semester of the senior year.

Prime Program in Camden is a nonresidential summer program that prepares minority students for engineering, pharmacy, and other mathematics and science professions. The Program serves ninth-grade students from the city of Camden. During the four-week summer program students receive an intensive course of study in mathematics, computer applications, and communication skills.

Future Directions

Funding is a current and future issue for precollege programs. It is critical that precollege programs continue to access external funding sources to underwrite their costs. This may prove to be increasingly difficult at a time when state, federal, and private funders are cutting or limiting expenditures.

There needs to be greater coordination, networking, and internal support for precollege programs. At present, programs have little, if any, contact with each other, and there is no overall coordination among programs through a central university office. The university needs to designate an office or unit responsible for coordinating and monitoring precollege program. Precollege programs and the university would benefit if the precollege programs were required to use a uniform grants-management system. Program staff are isolated from each other and would benefit from a university-managed network that regularly convenes and works with program directors as a group on each university campus. Directors

would benefit from the opportunity to share experiences and professional expertise with each other and to participate in capacity-building activities.

Most precollege programs are staffed by education and social-service professionals. University faculty are generally not involved in these programs. It would benefit both the programs and the university if there were greater faculty involvement, particularly in regard to curriculum, instructional practices, focused mentoring, and membership on advisory boards.

Most of the precollege programs have not been formally evaluated and have not collected the type of data necessary to document their outcomes. Both common and program-specific data needs to be collected on precollege programs. Program staff would benefit from engaging in focused and guided evaluation activity so both they and the university could have a clear understanding of program intent and effectiveness. These activities could best be coordinated by a designated university office or unit.

PROGRAMS FOR FIRST-YEAR STUDENTS

Introduction

The first year is extremely important for successful adjustment to college. All campuses of Rutgers have a range of offerings for first-year students that include orientation, specially designed first-year courses, remedial English and mathematics, learning and study skills courses, and honors courses. These offerings aim to promote adjustment to the university environment and academic success.

To begin, all undergraduate colleges at Rutgers have at least a three-day orientation program before classes start. Some colleges bring students in for a week-long orientation during the summer. Special programs such as EOF have comprehensive orientation programs that run for several weeks during the summer. In addition, Rutgers has established a variety of programs to ease the adjustment of transfer students to life at Rutgers. The Newark and Camden campuses have one- or two-day orientation programs specially designed for transfers. The Camden campus has outreach programs where admitted students are advised while they are still attending area community colleges. University College in New Brunswick has a transition program which offers miniclasses that prepare adult students for college work. Livingston College is directing increased attention to transfers with a special half-day orientation and follow-up advising after students begin classes. In addition to its orientation program, Rutgers College has a full-time assistant dean responsible for advising and follow-up of transfer students. Pharmacy, Mason Gross, and Engineering also have special orientation and advising programs for transfer students. These orientation programs are especially important at Rutgers because of the complexity of the university.

Courses for First-Year Students

Several divisions of Rutgers have developed successful year-long or one-semester courses for first-year students. These courses orient students to the mission of the college, focus on skills such as critical thinking and communication that provide the basis for effective learning in other courses, and in some cases provide a small-group learning experience. *Shaping a Life*, required for first-year students at Douglass College, examines how women's lives are shaped, based on biography, autobiography and oral history. An initial evaluation of *Shaping a Life*, completed during the year when half of Douglass first-year students were randomly assigned to the course, yielded a number of positive outcomes. A student who took the course was only half as likely to be dismissed and two-thirds as likely to withdraw voluntarily after her first-year, compared to a student who was not assigned to the course. *Perspectives in Agriculture and the Environment*, required for all Cook students, examines contemporary environmental

issues in small sections of 20 taught by full-time faculty. Peer tutors work with the first-year students in the course. Livingston 101, required for first-year students at Livingston College, prepares students for college. The course is taught in small sections by instructors who serve as college advisors for the students. Pharmacy Convocations and Pharmacy in Health Care, taught by the dean of the college, is required for all first-year College of Pharmacy students. The Freshmen Seminar Program in the FAS–Newark focuses on increasing oral communication, written communication, and critical thinking skills through small classes for first-year students. Various seminars in a small-class setting give students the opportunity to work closely with faculty members.

Academic Remedial Programs for First-Year Students

All entering first-year students take placement tests in writing, reading and mathematics, which are the basis for their placement in first-year courses. The mathematics departments on all three campuses offer a wide range of remedial courses from Computational Skills through Intermediate Algebra. These courses are taught in small sections of about 25 to ensure student performance and success. The writing programs also offer courses ranging from basic reading and writing to English Composition. The English departments also offer courses in English as a Second Language. On the Camden and Newark campuses, remedial English and mathematics and a range of learning and study skills courses are offered through the academic foundations departments. These programs allow students to remediate deficiencies in basic academic skills which would probably impede academic success.

In fall 1987, the New Brunswick Faculty of Arts and Sciences established the Gateway Program to address the problems associated with concurrent enrollment of skills-deficient students in remedial courses and standard first-year courses. Remedial students are placed in remedial math and writing courses and in special sections of courses in a wide range of disciplines: biological sciences, chemistry, physics, history, philosophy, sociology and psychology. These are credit-bearing first-year courses taught in sections of about 15 to 20, with additional contact time for recitation. The small class size, close working relationship with the course instructor, and increased contact time have proved to be successful. Several journal articles by Rutgers faculty and administrators have documented the success of the program. The Solid GEMS General Chemistry Program, based on a nationally recognized model developed by Cook College and the FAS chemistry department, has also proved to be especially successful in retaining minority students in science majors.

Honors Opportunities for First-Year Students

Exceptionally academically talented students also need special attention from the time they enter Rutgers in order to assist them in reaching their academic potential. All of the colleges at Rutgers offer honors programs for first-year students. These programs are discussed in the honors section of the report. Several departments have honors sections of first-year courses. High-achieving students are identified and placed in sections of introductory courses with other honors students. The New Brunswick Faculty of Arts and Sciences has made the expansion of discipline-based honors courses and sections of first-year courses a priority for funding over the next few years. This will offer increased opportunities for honors students to work in a challenging academic environment.

Future Directions

The *University Strategic Plan* has made support of programs for first-year students—such as honors programs, the Gateway Program, and the Summer Bridge Program—a priority. Continued support for and expansion of programs for first-year students is essential to ensure student success. Such programs can serve a variety of purposes, from orienting students to the mission and environment of their college, to

developing skills that will be essential for success in other college courses, to providing an enriched environment so that the most academically talented students are appropriately challenged.

RETENTION PROGRAMS

Rutgers students benefit from an extensive array of programs that provide direct curricular support for undergraduate courses. Because the academic requirements are very competitive and demanding, students often find themselves surprisingly unprepared to compete on an equal basis with their peers. Although students' innate intellectual abilities may be commensurate with the demands which will be placed on them in their academic programs, many students need and seek assistance with developing effective learning and coping strategies. These students have long-term goals which are high and achievable, and several retention programs have been developed to support the achievement of these goals. Other students who are deficient in basic skill areas are either required or strongly encouraged to participate in retention programs developed to remediate these areas.

Some of Rutgers' retention programs were initiated by faculty as a natural extension of their special interest in working with students beyond the classroom experience. Other programs were developed to meet specific needs of students, some of which are for all students who wish to take advantage of free academic support and others designed for particular populations with explicit needs. In other words, students who have been designated as "at-risk" of failure and also students who individually determine that they need and want additional academic support are provided with many options. Included in these options are several college programs designated for students on probation, but these programs are college-based and will not be discussed here.

Open Access: Serving All

Several programs serve all undergraduate students. The largest and newest of these general access support services are the Learning Resource Centers (LRCs), established on each of the campuses in 1992 as an initiative of the then new president, Francis L. Lawrence. These centers operate on five campuses (Camden, Newark and New Brunswick Cook/Douglass, College Avenue, and Livingston) and provide a variety of free programs, including peer tutoring, individual and group assistance in developing effective collegiate learning strategies, supplemental instruction supporting particular high-risk courses, and course support materials provided by faculty for their students' access. In the first four years of service, over 36,000 students have used one or more of the LRC services. A recent evaluation of Learning Resource Center services conducted by the Office of Institutional Research and Planning indicates that 96% of students who use the LRCs are satisfied with the outcome of their visits. Seventy-two % of visitors to the LRC would "definitely" and 26% would "probably" recommend the LRC to a friend. The evaluation also found that students' confidence in their academic abilities is more positive after a visit. Where only 38% reported confidence in their academic ability before their visit to the LRC, that figure rose dramatically to 82% after visiting the LRC. Students also attributed large gains in their performance in courses, learning skills, and writing ability to LRC visits.

Another program accessible to all students is the New Brunswick Writing Centers, sponsored and supervised by the English department. These centers, which operate on three campuses, provide personal assistance in writing, primarily for students in first-year composition courses. In addition, students who need assistance in completing writing assignments for other courses are supported when possible. Another support program open to all is the Math and Science Learning Centers on the Busch and Douglass campuses in New Brunswick, which were initially designed by the faculty of the physics department to

assist students in their courses. The program is now supported by the biology, chemistry, mathematics, physics and engineering departments and extends support in undergraduate math, science and engineering courses by providing course materials and student support groups. A Math and Science Learning Center is also in operation on the Camden campus, where instructional computing programs and videos are available to students in these courses. The high student use and satisfactory completion of the courses being supported are measures which demonstrate the effectiveness of each of these services.

The undergraduate colleges sponsor specially designed programs for their students on academic probation in order to assist these students in returning to academic success. These programs vary from college to college, may be either required or voluntary, and may be presented as short-term workshops or a semester-long noncredit course.

Serving Special Populations: Underrepresented Groups

Specific retention programs exist to support several unique populations of underrepresented groups, such as ethnic minorities and women. Students from these populations are given special consideration with carefully designed services which are strongly supported by the administration.

The Office of Minority Undergraduate Science Programs, under the direction of U.S. Professor of the Year (1995) Francine Essien, supports students of color to succeed in the sciences and enter medical studies. One, the Biomedical Careers Program, is a summer internship program which provides research opportunities to minority and economically disadvantaged students. Access-Med provides year-round academic support, counseling and workshops, and qualified participants can gain early entrance to Robert Wood Johnson Medical School. Another program is Success in the Sciences, cosponsored with Rutgers College, which provides biology, chemistry and math majors with academic support and tutoring in key courses.

Through a five-year grant from the Howard Hughes Medical Foundation, three science departments (biology, chemistry, physics) on the Newark campus have developed an extensive array of special support options which encourage minority students to enter the fields of science and find success. The program provides extensive course support, tutoring, supplemental instruction in difficult courses, and opportunities for research experiences with faculty. Although longitudinal program evaluation is incomplete, a number of the students who participated in the summer research experiences have already been accepted into graduate programs in the sciences and in medical schools.

The Douglass Project for Rutgers Women in Math, Science and Engineering provides an intervention program which is aimed at three goals: persistence in the science major, persistence in college, and the enrichment of the college experience. The project, which has received grants from the NSF, the Exxon Education Foundation, the Alfred P. Sloan Foundation, and others, provides a number of services: leadership and career information, community involvement, research internships, a Research Resource Center, Project SUPER for first-year women, peer study groups, close connections to faculty, a residential component mentored by female graduate students in the sciences, and a precollege program. Founded in 1986, the Douglass Project has refined its approaches to meet the changing needs and interests of the population it serves and has demonstrated increased persistence of participating students in their pursuit of mathematics, science, and engineering majors.

Serving Special Populations: Low-Income and First-Generation

Another special population which is the target of several intensive support services is that of students who come from low-income families. Every state community college and college and many private

institutions in New Jersey provide services through the Educational Opportunity Fund Program (EOF), and Rutgers' EOF programs excel in retaining students from this population who would otherwise in many cases be considered high-risk college students. Although each EOF program is unique and meets the needs of the students and college it serves, all provide free tutorials, counseling, academic and career advising and general support in making the successful transition to collegiate academic life. Since the inception of the EOF program, over 5,000 participants in the Rutgers EOF program have successfully reached their goals with graduation. These were students who were recognized as unlikely to succeed without intervention. The four-year retention rate for the program university-wide is 58%, with some individual colleges yielding significantly higher retention rates—such as the College of Pharmacy at 75%, Rutgers College at 74%, and Douglass College at 65%.

In addition to EOF, a federally funded Trio program called Student Support Services delivers tutoring, small-group assistance, workshops in reading, writing, math and science, and personal counseling and academic advising to students who are identified as meeting federal criteria for economically disadvantaged and first-generation college students. These students receive intensive service through intervention counseling and assistance as they make a successful transition into the rigors of university academic life and through the college experience to graduation. Although Student Support Services is based on the Livingston campus, students in other undergraduate colleges in New Brunswick may be participants. Documentation and assessment provided on a yearly basis to the federal government have shown success and warranted continued funding. The graduation rate for the 1980–1990 cohorts of students participating in the Student Support Services program was 57.3%.

Serving Special Populations: Basic Skills

Although Rutgers University ranks thirteenth among the public AAU schools when comparing combined SAT verbal and math scores of entering students, significant numbers of students are in need of basic skills instruction in either mathematics or writing and communication skills. To help these students gain the requisite basic skills, the undergraduate colleges provide specialized instruction and support.

The Newark College of Arts and Sciences provides basic skills instruction in communication and/or language instruction, mathematics, and science through an academic department called Academic Foundations. This department is staffed by tenure-track faculty who focus on serving the needs of students who are deemed not ready for the regular first-year courses in English, mathematics or science. On the campuses in New Brunswick and Camden, basic skills instruction is provided and supported by the English and mathematics departments. The following table provides data on basic skills students' persistence rates on the New Brunswick campus. The data show that students identified as having academic deficiencies were more likely to persist in their educational program if they participated in basic skills English or mathematics courses.

Data on Basic Skills Students Persistence Rates

| | Remedial Completers | Remedial Noncompleters | Tested with NJCBSPT but not Remedial |
|--|--------------------------------|-----------------------------------|---|
| 1988 Cohort 6-Year Persistence Rate | | | |
| English | 61.9% (291) | 20.0% (30) | 79.3% (3935) |
| Computation | 62.7% (59) | 42.9% (56) | 78.3% (4141) |
| Elementary Algebra | 68.7% (150) | 65.4% (104) | 78.3% (4002) |
| 1989 Cohort 6-Year Persistence Rate | | | |
| English | 67.9% (324) | 39.2% (51) | 80.6% (3994) |
| Computation | 61.5% (13) | 40.0% (45) | 79.6% (4311) |
| Elementary Algebra | 60.1% (158) | 62.6% (139) | 80.5% (4072) |
| 1990 Cohort 5-Year Persistence Rate | | | |
| English | 70.4% (233) | 41.3% (46) | 77.6% (3920) |
| Computation | 75.0% (36) | 56.7% (30) | 76.9% (4133) |
| Elementary Algebra | 61.6% (185) | 64.1% (117) | 77.9% (3897) |

In addition to the traditional basic skills instruction which is offered through the English and/or mathematics departments, faculty in 10 New Brunswick academic departments develop and administer subject-specific, credit-bearing developmental courses called Gateway. The Gateway program, which receives support and additional funding to the academic departments from the dean of the F.A.S, offers developmental students introductory courses under positive conditions. Typically, Gateway classes are much smaller than standard introductory courses, and instructors are experienced and motivated to teach this population. Although the material covered in each Gateway course is the same as in the standard course, alternative methods of instruction are heavily employed and additional time in class is required. Longitudinal studies conducted by the Office of Institutional Research show that the students with the most serious skills deficiencies benefit most from taking Gateway courses.

Serving Special Populations: International Students

International students who are enrolled full-time at Rutgers are generally provided with all special academic assistance in the undergraduate colleges, as well as through the auspices of the open access services of the Learning Resource Centers, the Writing Centers, and the Math and Science Learning Centers. Another group of international students at Rutgers is those who have not matriculated and at the

university in order to receive intensive language instruction in communicating in English (PALS Program).

Serving Special Populations: Students with Disabilities

Services for students with disabilities are coordinated through the Office of Diverse Community Affairs. Each college throughout the university has designated a dean who serves as the college coordinator of services for students with disabilities. These deans receive information from the students who are seeking assistance and accommodation for a disability through a self-disclosure process. The dean then serves as a spokesperson for the student, when needed, so that faculty and support staff can and actually do provide appropriate accommodations.

In special situations where a student appears to exhibit a learning disability that is having an impact on academic performance, the student can be referred to and tested by the Psychological Clinic of the Rutgers Graduate School of Applied and Professional Psychology. When testing indicates that guidance in developing new and appropriate coping mechanisms would be relevant and necessary for the student, a referral is usually made to the Learning Resource Centers where individualized assistance is provided.

Although an effective infrastructure is now in place to support students with disabilities, more effort must be made to help faculty develop a better understanding of the laws regarding educational opportunities, and develop more effective methodologies and mechanisms for use in the classroom.

Future Directions

The success of Rutgers' retention programs can be seen in the relatively high graduation rate of its students. Rutgers is among the top 10 public AAU institutions in its six-year graduation rate of 71%. While Rutgers supports a wide variety of academic support programs throughout the university, additional coordination is needed to yield full benefit from these programs. Much effort has been made in the past few years to network these services and bring about both collaboration and definition among the various programs, for example through the New Brunswick Retention Coordinating Council. Much is still to be done.

- (1) Establish a collective vision. Build a learning community within which faculty, staff and student groups freely cooperate in order that students with academic problems can easily and conveniently find assistance. Improve and expand the working relationships among the various academic support programs.
- (2) Commit to measurable outcomes and the support to conduct program assessment. Provide assistance in program evaluation and financial assistance in carrying out the plan.
- (3) Publicize availability of support services better, to both students and faculty. Mount a multiple-source campaign involving all of the following: information pamphlets and/or wallet cards, advertising in the campus newsletters, email, and student information services. Educate residence counselors regarding existing services so that they become a source of referrals.
- (4) Increase faculty involvement. Encourage faculty to refer struggling students to support services. Establish opportunities for faculty to observe and participate in various support programs.

- (5) Encourage peer support initiatives. Recognize student preference for seeking peer support. Reach out to and involve student honor societies and/or service organizations. Encourage student consultation with faculty and staff.
- (6) Construct a cybersupport system. Take full advantage of the opportunities emerging from the communication revolution. Develop a system to allow students to receive help online from qualified tutors, arrange peer study groups, discuss academic topics, and/or tap into the resources available through the Web.

HONORS PROGRAMS

Introduction

Rutgers University has flourishing undergraduate honors programs on each of each three geographically distinct campuses. In addition, the several collegiate units, specialized degree programs, and departmental units offer a wide variety of honors opportunities, demonstrating our commitment to high-quality education of outstanding Rutgers students. The range of offerings and the diversity of the constituency is truly remarkable.

These strengths reveal, however, a need for further coordination among the many programs, courses and students across campuses, collegiate, program, and departmental units. In addition, a more systematic effort to compensate departments for their participation in nondepartmental interdisciplinary courses is required if this important component of general honors is to be sustained. These needs are currently being addressed on each of the campuses and within the many subunits of the campuses in a period of extraordinary development which promises both expansion of existing programs and more coordination among units.

Current Status

Each of the campuses has a broad range of courses which challenge students to cross traditional disciplinary boundaries. Courses such as the following have been highly praised by students and faculty alike.

The Greenhouse Effect—from the varying perspectives of chemistry, physics, and meteorology
 Physics and Photography
 When Harlem Was in Vogue
 Culture, Boundaries and Justice—understood via a series of films, novels and political-historical studies
 Paris 1861–1924: Intersections among the Arts
 From Order to Chaos
 Shakespeare and the Question of Authority

Colloquia which introduce students to contemporary ethical/cultural problems with speakers including Maya Angelou and Cornel West; trips to theater and museums in New Jersey and New York as well as visits to local observatories; and programs that involve students in volunteer civic projects have combined to further enrich student experience at Rutgers. These academic and cocurricular activities are generally capped with a senior project—two semesters of thesis or a comparable project—”capstone” seminars, and oral presentation and defense of thesis. From campus-wide initiatives to specialized departmental projects students are given a great variety of experiences that prepare them for the best graduate and professional programs in the country, intellectual challenges that enhance their abilities to write, speak, and work in

groups, and so prepare them for the contemporary workplace with its ever more pressing demands in each of these areas.

The New Brunswick Campus offers honors programs at each of its major collegiate units—Cook, Douglass, Livingston, Rutgers, and University Colleges. Each has a program that engages students in a four-year sequence of course work, research, and cocurricular activities. Each begins with interdisciplinary offerings for first- and second-year students and moves beyond them to ever more focused projects that result in the awarding of honors with the students' degrees. Often these programs intersect with honors offerings within individual departments, with students writing senior theses and participating in "capstone" seminars. Thus, students are often awarded both general honors and honors within their departmental major. The flexibility of the programs, however, permits students to engage in departmental honors and write senior theses without being part of one of the general honors programs. Similarly, with appropriate faculty supervision, students can continue the interdisciplinary work begun in their first two years and choose not to participate in departmental honors, graduating with general honors.

The Douglass Scholars Program admits a group of 50 entering students each year and has about 220 students enrolled. Students must have combined SAT I scores of at least 1300 and rank in the top 10% of their graduating class. These students participate in a group of interdisciplinary seminars and colloquia which culminate in a significant senior project. In addition, highly qualified students are invited to participate in the Mabel Smith Douglass Honors Program in which they engage in intensive independent research culminating in a substantial thesis. Livingston College offers a four-year program beginning with seminars which are paired with first-year writing courses in an intensive interdisciplinary experience. Interdisciplinary courses continue in the second year, followed by a junior year designed to prepare students for senior thesis work. The Paul Robeson Senior Honors Program makes intensive thesis work available to students who have participated in the four-year program and to others who have outstanding records. This program has a total of 90 students enrolled. University College offers "mini-" honors seminars and honors and advanced-honors seminars, as well as a senior honors thesis option for 40 students. The Rutgers College General Honors Program offers a wide variety of interdisciplinary courses (at least three courses), one from each of three areas: humanities, social sciences and math/science. These first- and second-year courses are followed by a junior project in which each student chooses (1) to study abroad; or (2) to participate in a national student exchange program, an honors civic education course with a community service outreach project such as CASE; or (3) to engage in independent study and research. All of this culminates in a Henry Rutgers Scholars thesis, sometimes combined with departmental honors, or a general honors interdisciplinary thesis, or graduate courses in the major. Additionally, honors students at Rutgers College may elect to live in honors housing. This program admits 200 new students each year, and has an enrollment of approximately 600 students. Finally, the McNair Scholars Program has been particularly successful in providing close mentoring in honors-level curricula aimed at the needs of nontraditional students, in particular preparing them for graduate and professional school via a specially designed two-year training program.

There is a concerted effort in the New Brunswick Faculty of Arts and Sciences to assist in the expansion of these collegiate programs and to supplement the interdisciplinary offerings, at the core of each, with a wide range of departmental courses. Beginning in fall 1997, FAS–New Brunswick offers a set of courses open to all honors students in the four New Brunswick colleges. A wide variety of such courses is offered as a part of this curriculum—small honors lectures and discussion sections of courses frequently taken by first- and second-year students, courses on special topics of particular current interest,

seminars with an interdisciplinary focus, and more advanced discipline-based courses and seminars. These courses will provide honors students with a greater opportunity for personal interaction with some of the most outstanding members of the university faculty, in small classes designed to provide challenging academic experiences. Honors course offerings at the introductory level are already planned in the following departments: chemistry, English, French, geology, history, linguistics, mathematics, philosophy, physics, political science, sociology, and women's studies.

The School of Engineering, the School of Pharmacy, the Mason Gross School of the Arts, and Cook College also have honors programs designed to complement the professional and preprofessional work that predominates at these units. While there are interdisciplinary offerings available in some of these programs, the focus is more departmental and integral to the certification requirements of many of the programs offered in these schools.

The Newark College of Arts and Sciences has developed a two-year program for juniors and seniors, including qualified transfer students. The program currently serves 115 students. Students must be recommended by faculty and/or have averages of 3.5 or better after the completion of 60 credits. All majors are represented, including students from the School of Management. In the junior year students register for two credits of colloquia. In the senior year students engage in year-long projects for which they earn six elective credits. While the majority involve research in the student's major, interdisciplinary work and creative efforts are also encouraged. In recent years, a premed chemistry major wrote a string quartet and a piece for chorus and piano, a finance major went to clown college and developed a motivational program for encouraging inner-city youth to learn to read, and several prelaw students majoring in history or political science have written novels.

Newark's honors program aspires to the expansion of its offerings. To this end it is planning the development of a four-year honors college scheduled to open in the fall of 1998 with 30 students selected on the basis of their high school records, SAT scores, personal interviews, and an essay. This will expand the current offerings with a series of interdisciplinary seminars for the first three years, combined with cocurricular activities and civic projects culminating with a senior thesis or project of the sort that currently exists. There will be merit scholarship awards offered to these students and special admissions opportunities in association with the Newark Law School and the School of Criminal Justice through which students are guaranteed admission to these professional schools as part of a five-year program.

The Camden College of Arts and Sciences offers a two-semester seminar sequence each year and currently serves about 95 students. Focusing on a range of topics from "The Frontiers of Science," to "Vox Populi, Vox Dei," to "Academia and the Public Schools," a seminar has been offered each year since 1985. Taught by distinguished members of the faculty as well as guest scholars and artists, these seminars challenge students to find connections among various forms of knowledge and to thereby bring deeper understanding to the major field of study. The experience is capped with a substantial paper on some aspect of the theme of the seminar, and "in a form intended for a general reader."

Future Directions

Diversity and excellence characterize each of the existing honors programs. Expansion and coordination describe the ambition of all. There are opportunities currently under investigation and development which will help to coordinate the recruitment of faculty and courses into both disciplinary and interdisciplinary programs. There are, of course, additional costs involved. There are monetary costs when a faculty member must be released from departmental teaching to offer an interdisciplinary course.

At present, departments are offered between \$1,000 and \$2,000 for some of the faculty whom they release, but this varies by department and by budgetary and programmatic restraints of individual programs. (The departmental course can, naturally, be dropped, or taught by a less experienced teaching assistant or part-time lecturer, but the costs are then simply calculated in different terms.) There are also costs involved when a faculty “star” is taken from a large lecture class and placed in a small honors seminar.

Expansion can be accomplished with greater coordination among the various units of the university. Developing departmentally based honors courses and sections reduces the “losses” to departments. Offering flexibility to departments—for example, by permitting them to admit strong student majors to the departmentally based honors courses—broadens the base of students for whom new courses are available. Coordination can result in a bigger pool of potential teachers and courses, maintaining the interdisciplinary foundation of collegiate programs, while more equitably spreading the “burden,” which departments feel, and rewarding more consistently those who participate. Still, funding questions must be paramount in any effort at expansion, and the need to have these funds as part of each year’s operating budget deserves attention and commitment, so that planning and implementation of new programs may proceed. Honors programs in New Brunswick have been allocated SROA funds to enhance opportunities for high-achieving students and to serve as a recruitment tool to attract New Jersey’s brightest students.

In conclusion, we aspire to maintaining a healthy mix of interdisciplinary offerings for many entering honors students, supplemented with departmental offerings, both at the introductory level and as students engage in the culminating honors project (often a thesis project). From the breadth and diversity of early offerings to the more focused research opportunities in the junior and particularly senior years, our goal is to recruit the best students in New Jersey and beyond. Once they are here, the excellence of their preparation for graduate and professional school and for the workplace of the 21st century must be our constant focus. To this end honors students must be challenged and excited by teachers and courses and by their fellow students both in the classroom and outside it. The numbers of these students must increase as must the frequency of their interaction, formal and informal, throughout their Rutgers experience.

Finally, they must be offered increased opportunities to engage in sophisticated research, collaboratively with our best faculty and, when appropriate, with researchers and research units outside the university. They must also be afforded the opportunity to share their projects and their findings with one another and with the broader Rutgers and New Jersey communities.

SUPPORTING FACULTY TO ENHANCE TEACHING AND THE CURRICULUM

INTRODUCTION

Just as faculty members at major research institutions have a deep-seated commitment to remain current in their research disciplines, so also they have a responsibility to keep current with best-practice methods in teaching. Whether learning to use classroom assessment techniques, group learning methods, or new instructional technologies, faculty have a duty to themselves, their peers, their institutions, and their students, to be as expert in their knowledge of teaching as they are in their knowledge of their disciplines.

The demands on faculty to be excellent both in their research and in their teaching are substantial. We would not expect faculty to succeed in their research disciplines without a commitment of university resources to provide support services, libraries, computing facilities, laboratories, and the like. Similarly, a university committed to excellence in teaching must provide support services for faculty willing to be innovative and excellent teachers, and the reward structure of the institution must fully recognize this faculty role. Over the past five years a number of structures and programs have been initiated that address these issues.

The university under President Francis Lawrence has renewed its commitment to excellence in undergraduate instruction. Among the visible and meaningful actions taken as evidence of this in the past five years have been: the creation of the Office of the Vice President for Undergraduate Education; the creation of the teaching excellence centers on each of the campuses; and the use of university, state and student-fee funds to improve the technology of instruction.

SUPPORTING FACULTY THROUGH THE OFFICE OF THE VICE PRESIDENT FOR UNDERGRADUATE EDUCATION

The Office of the Vice President for Undergraduate Education initiates university-wide strategies to improve undergraduate education. Since President Lawrence created the office in 1992, it has developed a number of programs to support faculty members in their teaching and curriculum development efforts.

In order to support faculty members in strengthening the curriculum the office has created a number of small grants programs and vehicles for disseminating information about new curricular directions.

- The Rutgers Dialogues Grants program awards \$100,000 each year to faculty members for projects focused on new ways of meeting the university-wide learning goals. A number of these projects are becoming institutionalized. These include first-year courses such as *Shaping a Life* (Douglass College) and the Freshman Seminar Program (Newark College of Arts and Sciences); a set of courses that integrate writing across the curriculum; reform of the teaching of calculus to include small-group active learning; and a variety of efforts that integrate use of information and computer technology in classes.
- The Undergraduate Curriculum Seed Grant Program awards small grants to support faculty in obtaining major funding from private foundations and government agencies for curriculum innovation. A number of faculty members have been successful in obtaining funding from agencies such as the NSF after completing pilot work through this program.
- The Rutgers Undergraduate Research Fellows Program supports research projects that involve collaboration between faculty members and students. Through this program, students learn about research by doing research with faculty members.
- The Undergraduate Research Web site (URRU) provides a mechanism for linking students with the hundreds of research opportunities that exist at this institution.
- The Undergraduate Education Advisory Council has members from business and industry as well as the university community. The council, chaired by the vice president for undergraduate education, provides a mechanism for input to the university from the

employers of our undergraduates. The council sponsored a major seminar attended by about 200 faculty members, “The 21st Century Workplace: Implications for Higher Education.”

The office has also initiated a number of actions and programs that have helped to strengthen the recognition of the teaching role of faculty members.

- The Teaching Evaluation Development Grant program provides funds to academic units for development of comprehensive multimethod processes for evaluation of teaching. Through this program a number of academic units have initiated use of peer evaluation of teaching, teaching portfolios, and “capstone” assessment of program majors.
- Evaluative information used for promotion and tenure decisions has been changed to include information on teaching activities of faculty members and assessment data related to these activities.
- The Rutgers Award for Programmatic Excellence in Undergraduate Education annually awards \$10,000 to an academic unit demonstrating sustained excellence in teaching. This award underscores the importance of undergraduate education and rewards departments that have focused their effort and resources on creating a superior learning environment for students.

TEACHING ASSISTANTS AND PART-TIME LECTURERS

At a research university with Rutgers’ strengths, undergraduates have the benefit of many intellectual and educational opportunities. Excellence in our graduate programs attracts outstanding students who become superior teaching assistants in training to become professionals. Equally important, because of its location, Rutgers is able to attract individuals who work as part-time lecturers and bring unique expertise to our classrooms (for example, instructors in the School of Business and creative writing faculty in our English departments). Many of these lecturers teach regularly over a period of many years. They are well integrated into their programs, understand the university, and are respected, unionized members of the teaching faculty. The university has worked conscientiously to train its teaching assistants and to ensure that their obligations in the classroom do not undermine their work as students and researchers. Still, there is the potential danger, in times of budgetary stringency, of over-reliance on teaching assistants and part-time lecturers. The percentage of teaching assistants and part-time lecturers teaching undergraduate courses, particularly at the introductory level, is carefully monitored by the university in order to ensure that tenured and tenure-track faculty in the disciplines provide much of the instruction in introductory courses that prepare students for further work. Departments must continue to focus carefully on (1) the ways TAs and PTLs are integrated into instructional culture; (2) providing pedagogical instruction and supervision; and (3) rewards for time spent outside the classroom in advising, course development, and similar activities.

TEACHING EXCELLENCE CENTERS

Teaching Excellence Centers (TECs) have been established in Newark, Camden, and New Brunswick. All three centers report to the vice president of undergraduate education on policy matters. The Newark and Camden TECs are funded by the provosts on their campuses. The general mission of all three TECs is to provide the following to the faculty:

- (a) Resources to the faculty for the improvement of teaching.
- (b) Workshops, seminars, and programs that provide forums for the discussion of issues pertinent to the improvement of teaching.
- (c) Resources and services that contribute to a comprehensive and meaningful assessment of teaching to be used both for evaluation and faculty development.

Though each TEC serves the same general mission, each has evolved its own way of serving its faculty.

- The TEC in New Brunswick has responsibility for the distribution, processing, and analysis of the results from the university-wide Student Instructional Rating System. This TEC also awards approximately \$70,000 per year in grants to faculty and departments through the TEC Grants to Improve Teaching program. In addition, the TEC-NB presents workshops, seminars, and lectures on teaching, and supports the development of new technologies for teaching. The center has supervised the Lilly Endowment Inc. Teaching Fellows Program for the past three years. The Lilly program has focused on developing a cadre of young faculty members to become institutional leaders in use of new instructional technologies. The TEC director is also the coprincipal investigator, together with the associate dean of the faculty of management, for the GE Fund Learning Excellence Project.
- The TEC in Camden has focused attention on two major issues: the development of teaching portfolios for faculty in Camden, and support for the development and use of instructional technologies. Many faculty in Camden now use teaching portfolios, thanks to the TEC efforts. In addition, the TEC has been a leader in training faculty in the development and use of multimedia instructional tools. Recently, a multimedia CD-ROM was developed and made available to Camden faculty. This software presents models and ideas for faculty to use when they develop their own instructional tools. The TEC-C also offers consulting services to faculty for the improvement of teaching.
- The TEC in Newark awards small grants to faculty for the improvement of teaching. Its main focus, however, has been the provision of an array of consulting services to departments and to individual faculty. One example is the Departmental Self-Study Program. In this program, the TEC staff interviews all members of an academic department regarding the instructional services of the department. The TEC then provides the department with a confidential memo summarizing faculty views, and makes a series of recommendations on how the TEC can help the department reach its goals.

IMPROVEMENTS IN THE TECHNOLOGY OF INSTRUCTION

There have been three major initiatives in the area of instructional technology in the past few years that have had a significant and positive impact on teaching and learning at Rutgers University.

In 1993, the university imposed on students a fee to fund the development and maintenance of adequate computer facilities. Full-time students are assessed a fee of \$50 per term, or \$100 per academic year, and part-time students are assessed a fee proportional to the number of credit hours for which they have enrolled. This fee generates a total of \$4 million per year, which has been used to create new computing facilities for students, to provide each student and faculty member with an email account that

is maintained throughout their relationship with the university, and to fund departmental projects that have improved the instructional computing environment.

The Equipment Leasing Fund (ELF) supported the development of many large computing projects in New Brunswick. ELF funds supported new equipment in the libraries, and the creation of the “research computing initiative” computer that now hosts most faculty email accounts and Web sites.

The Higher Education Facilities Trust monies gave the university the opportunity to create an improved environment for instruction through a large number of construction and renovation projects. Of particular interest for instructional computing are: the construction of the new Science and Engineering Resources Center, or SERC II, which will house additional classrooms and a new 450-seat lecture hall, and the renovation and redesign of 28 classrooms and 10 lecture halls to create “smart classrooms.” The HEFT Classroom Renovation Program Committee, chaired by the TEC-NB director, helped to plan and design the new “smart classrooms.” These new classroom facilities have, for the first time, given the faculty access to any teaching technology they care to use, from computer projection, to video, to the Internet.

FUTURE DIRECTIONS

Rapid changes in disciplinary information and teaching technology point to the need for continuous and comprehensive faculty support and development efforts. Three areas will be of particular importance in the coming years.

The demand by the faculty for support services to help them learn how to develop and use new instructional technologies has skyrocketed. Faculty want to know how to design Web pages, use graphics packages, use audio and video in the classroom, and consider restructuring their pedagogy to take advantage of the profound changes that the information and communications revolution make possible. The need for faculty development in this area will be significant. Acquisition of hardware and software is not enough to ensure creative and appropriate use of technology. The Teaching Excellence Centers must be equipped to provide the support that faculty members will need in order to use technology effectively to enhance teaching.

Strengthening links between teaching and research is necessary in order to ensure efficient use of the resources of a research university and a superior undergraduate educational program. Programs that support such integration assist in the provision of an undergraduate educational experience that takes full advantage of the research university environment. Additional support is needed to assist faculty members in providing the mentoring required for developing a full understanding of the research process in a large student population.

Previous sections of this report have noted the need for expanded assessment of student outcomes. Although some of this assessment can be accomplished at the institutional level, individual colleges, schools and departments will need assistance in carrying out the tasks necessary to obtain a fuller picture of the effects of undergraduate education at Rutgers. This support may include training in assessment and evaluation issues, consultation regarding development of assessment instruments and evaluation design, and funds for implementation of evaluation plans.

COCURRICULAR SUPPORT AND STUDENT LIFE

The student-life programs at Rutgers University establish a supportive environment for creating citizens who can make positive contributions to their campus community, the state of New Jersey, and the developing “global village.” Student life outside the classroom is seen as integral to the undergraduate educational experience and academic success, and can support the goals of undergraduate education. Student life and cocurricular programming focus on individuals’ interactions, the change in populations in society, and on global connections. The values of access, service to others, and excellence provide the impetus for programs in these areas.

UNIQUE ENVIRONMENTS

A unique feature of Rutgers University is the system of multipurpose colleges and schools. Each of these units has a distinct mission, and its own history and geography, and has developed its own unique living/learning community. Despite the individual locales and cultures of the various campuses, students are quite mobile and register and participate in many university offerings. Given the varied options among the colleges, there is a strong need for cross-campus coordination and communication. The challenge of consistent application of policies and distribution of resources is a concern. A coordinating council of deans and student-life professionals who meet regularly serves to assure consistency and equity in local programming and services.

Another unique feature of Rutgers is that several communities around the state of New Jersey provide “homes” for its various campuses. Some of these environments are urban in nature and provide the opportunity for in-depth community/campus interactions with the potential to strengthen academic offerings. As indicated in a previous section of this report, students are involved in a wide variety of service activities within the various Rutgers communities.

CHANGING STUDENT POPULATIONS

A primary focus for student-life and cocurricular programs at Rutgers is to assist students in understanding and dealing with diversity in the backgrounds and lifestyles of the student body. A main thrust is to improve first-year orientation programs to create a learning community from a changing and diverse student population. In addition to the traditional-age college population, there are increasing numbers of full-time wage earners, single parents, married couples, and day and evening commuters. There are, as well, rapidly growing changes in the racial, ethnic, religious and national-origin backgrounds of students.

The university Multicultural Blueprint and the reinvigoration of the Committee to Advance Our Common Purposes have sent a clear message about the kind of campus climate and open dialogue advocated at Rutgers. As the student community continues to increase in diversity, student-life programs, structures, and personnel must also reflect that diversity. Currently within the student-life areas, there are a number of curricular and cocurricular initiatives directly addressing the issues of differences and commonalities among students. For example, in several colleges, groups of students are trained to be

multicultural peer educators and are involved in the orientation program for incoming first-year students. In small-group settings, these peer educators lead frank and open discussions. Some use an internally produced video with various scenarios on racial, gender and sexual orientation issues. This provides preparation for living in residence settings where diversity is a daily and sometimes disquieting experience for which there has been no adequate preparation.

THE GLOBAL COMMUNITY

Another focus for student-life programming is global connections and interdisciplinary cocurricular programs. Frameworks are being created and implemented for increasing global access for students. Students whose experiences are presently limited to a local or regional area must be encouraged to explore far beyond these boundaries. Those for whom affordability is a concern must be assisted financially through supplemental university funding or through endowed funding. For example, a course-for-credit trip to South Africa during the spring break is led by faculty and administrators, with a group of 20 students. With cooperation from the Camden sociology and anthropology departments, and funds provided by provosts, deans, the Committee to Advance Our Common Purposes, and self-support, the students will participate in intense and “hands-on” research and fact-gathering excursions about all aspects of student life in six of the major universities in South Africa and Namibia. Upon their return, they will submit a journal and a term paper written for academic credit. This experience will provide a context for students to analyze critically the information they previously saw only through news media. It may also provide an opportunity to erase stereotypes and to reveal the possibilities for social and economic growth within the African continent. This framework of students, faculty, and staff working together on global programming should be seen as a model for other student-life efforts.

PRIMARY CHALLENGE

To fulfill the mission of creating citizens who will make positive contributions in the face of rapid change, student life at each undergraduate college must provide accessible and quality programs. There must be coordination and collaboration in various student-life offices including career services, health services, diverse community affairs, fraternities and sororities. Students must be presented with an array of leadership-development opportunities including volunteer and credit-earning community service, career exploration and internships, cross-cultural awareness, conflict resolution, legislative experience, and international travel. Some of the trends in student demographics, such as more adult, part-time, and working students, provide a challenge in terms of offering student-life opportunities that all students will have reasonable access to.

Even with collaboration and coordination, one of the most serious threats to the quality of student-life programming is its dependence on a fee-based financial structure. It is important that new and stable sources of funding be identified to assure that student-life staff can provide access to a total collegiate experience for all students.

OUTCOMES ASSESSMENT OF UNDERGRADUATE EDUCATION AT RUTGERS

INTRODUCTION

As this discussion reveals, Rutgers University has a wide-ranging and vigorous program of undergraduate education and is firmly committed to providing its undergraduates with a quality education. Outcomes assessment significantly contributes to the university's effort in this area. Outcomes assessment of undergraduate education involves the process of clearly stating the institutional goals of undergraduate education, documenting how these goals are being achieved, evaluating whether these goals are being achieved, and identifying what needs improvement in an institution's delivery of undergraduate education.

Outcomes assessment of undergraduate education at Rutgers is eclectic, wide-ranging, and complex. It has both strengths and weaknesses, which, in many respects, makes it much like the field of outcomes assessment itself. In general, outcomes assessment needs to be a cooperative affair among faculty, staff, and students, and to occur in many areas of undergraduate education such as basic skills, general education, and academic specialization. Assessment of undergraduate education relies on outcomes from various levels, including the individual, classroom, program, and institution, and involves both cognitive and noncognitive areas of intellectual and social maturation. All of these aspects of undergraduate outcomes assessment occur at Rutgers to varying degrees.

FACULTY/STAFF/STUDENT COLLABORATION AND THE ORIENTATION TOWARD ASSESSMENT

The engine driving the assessment of undergraduate education at Rutgers over the past decade has been the various faculty/staff/student committees that have examined undergraduate education at the university from various perspectives. Reports highlighting these efforts over the last decade include *Reports of the Provosts' Committees on Undergraduate Education in the Context of a Research University*; *Undergraduate Education at Rutgers: An Agenda for the Nineties*; *Rutgers Dialogues: A Curriculum for Critical Awareness*; *A Proposal for Teaching Excellence Centers on Each Campus of Rutgers, The State University*; and *Liberal Arts and Sciences Strategic Planning Implementation Committee Report*. These efforts have resulted in the clear definition of learning goals for undergraduate education at Rutgers, which are perhaps best summarized in the Rutgers Dialogues program discussed above in the section "Educational Goals for Our Students."

Other goals besides those directly related to learning also play an important role in the assessment process at Rutgers. These goals cover the social, personal and moral development of undergraduates, and also extend to student services and student life. Recent university reports that have identified undergraduate education goals in these areas include *Multicultural Student Life: A Special Report to the Rutgers Community*; *In Every Classroom: The Report of the President's Select Committee for Lesbian and Gay Concerns*; *Report of the Committee on Administrative Systems Efficiency*; and *Report of the Committee to Study Routine Requests for University Action*.

Many examples exist at Rutgers to document the university's efforts to achieve its undergraduate educational goals and the assessment of their success or failure. The following sections describe some of these efforts in basic skills assessment, academic program assessment, and general education assessment.

BASIC SKILLS ASSESSMENT

Rutgers has had a longstanding history of assessment activity in the area of testing and remediating students for basic proficiency in verbal and mathematical skills. For example, in fall 1994 approximately 1,100 out of the 6,000 undergraduates tested were placed in 167 sections of remedial courses. Rutgers tests all first-year students who are entering the university for the first time through the administration of a series of tests that are used both to gauge the basic competency in these two basic skills areas and to place students in either remedial or introductory English and mathematics courses. The university's administration of the basic skills testing and placement program was part of a state-wide mandated program that required all public colleges and universities in New Jersey to test entering students for basic verbal and mathematical competency. However, recent changes in the structure of higher education within the state have left the administration of this program to the discretion of each institution. In the absence of the state mandate to administer the basic skills program, Rutgers has decided to continue the program while seeking to make it more effective and sensitive to the needs of its faculty and students. Over a two-year period a university-wide committee has explored the current testing program and has recommended the development of a series of in-house test components that provide a system of testing and placement while accommodating the specific developmental course sequences found on each campus. One of the mainstays of the program is the inherent process of reevaluation of students who are remediated. Students can move on to take nonremedial, required courses in these two academic areas only after their successful completion of the remedial process.

The aggregation of verbal and mathematical testing results (e.g., the total number of students who are required to take remedial courses and the total number of students who successfully complete these courses) provides the university with data to assess the overall success of its basic skills testing program.

ACADEMIC PROGRAM ASSESSMENT

The assessment of student competency in the chosen academic field is a critical component of any outcomes assessment program. At Rutgers, there are a number of mechanisms that ensure the attainment of such competency by undergraduates. First, each academic program is subject to periodic review by the Committee on Standards and Priorities in Academic Development (CSPAD). In these periodic reviews, which rely heavily upon external peer site visits and departmental self-study, all aspects of a program's activity, including the program's performance in the area of undergraduate education, are examined and assessed. In undertaking this role, CSPAD ensures that the academic integrity of a department or program is maintained and that these academic units are viable agencies in the substantive preparation of undergraduates in their chosen field of study.

Another mechanism for the assessment of performance by students in their chosen fields of study emerges through the requirement that all academic units provide annual accountability reports. These reports consist of information that describes the accomplishments and activities of an academic unit during the past year and outlines the plans of the unit for the coming academic year. In addition to providing university and academic administrators with much useful information, the process of completing these reports also allows academic administrators and faculty of each unit to review and assess

their program's performance in undergraduate education during the just-completed academic year. The importance given to these reports by the university has been reinforced by the recent revisions of the reporting format and by the use of the reports by university administrators.

Outcomes assessment also occurs in this area through the offering of academic units of "capstone" and seminar courses, honors thesis work, and the development of student portfolios.

GENERAL EDUCATION ASSESSMENT

The area of general education includes the development of broad academic and nonacademic (i.e., personal and social) skills that undergraduates are expected to possess upon successful completion of their undergraduate careers at Rutgers. Efforts to assess outcomes in the area of general undergraduate education have been widespread at Rutgers.

Much of this information on educational outcomes has been collected through an ongoing series of student surveys administered by or in collaboration with the Office of Institutional Research. Included in this effort are the *Graduating Student Survey*, the *Former Student Survey*, the *Continuing Student Survey*, and the *Academic Services Needs Assessment Program Survey* series. These survey instruments have been designed to capture: (1) the academic experiences of Rutgers undergraduates; (2) the evaluation of student services—both academic and nonacademic; (3) student academic and career goals; and (4) the reasons for attending and, where relevant, leaving Rutgers. Results from these surveys have provided various university and academic administrators with benchmarks to assess the success of academic and nonacademic programs in the intellectual, social, and personal development of Rutgers undergraduates.

Other data collected by the Office of Institutional Research provide additional benchmarks for the evaluation of the success of undergraduate education at Rutgers. One of these efforts is the collection, analysis, and presentation of data regarding the retention and graduation rates of undergraduates. These data can often be misused and misunderstood by academic and nonacademic officials alike; but when used properly, these data provide administrators, faculty, and students with a quick overview of how well an institution is doing in ensuring that the university's undergraduates are successfully completing their course of study. Two steps are taken at Rutgers when working with these data. First, the data are placed in a comparative context with retention and graduation rates of peer institutions such as the public universities which are members of the AAU. In addition, the university has actively participated—and continues to participate—in national studies of retention and graduation rates, which seek to develop models of retention and graduation that allow individual institutions to estimate how well they are doing in relation to other colleges and universities. In one study carried out by researchers at the University of Arizona, Rutgers ranked ninth out of 44 large public research universities.

The Office of Institutional Research at Rutgers is also responsible for gathering and presenting other data that allow for the broad assessment of undergraduate education. These data are often found in periodic publications such as the *Rutgers Fact Book*, the *Institutional Research Update* series, and the *Rutgers Accountability and Excellence Report to the State of New Jersey*.

FUTURE DIRECTIONS

The preceding discussion underscores the point that outcomes assessment plays an important role in the delivery of undergraduate education at Rutgers. However, it is also clear from the above overview that much still needs to be done in this area. There exists a need for an integrative approach to undergraduate

assessment. As is apparent from this discussion on outcomes assessment, there is no systematic integration of assessment practices at Rutgers. Much of the responsibility to measure outcomes of undergraduate education at Rutgers resides with the Office of Institutional Research through its supervision of the Basic Skills Testing and Placement Program, its conduct of institutional surveys of students, and its collection, analysis, and dissemination of educational data. Further, other assessment practices at Rutgers largely occur under the aegis of the various academic departments, programs, and colleges, with little or no coordination among these programs with regard to their assessment practices. Thus there is a need to provide a framework for these assessment practices so that, at the very least, a coherent picture of the academic and nonacademic development of Rutgers undergraduates can be presented and examined.

CONCLUSIONS: UNDERGRADUATE EDUCATION FOR THE 21ST CENTURY

Rutgers University currently provides outstanding educational experiences for its undergraduates. Students have access to an unending array of courses, which offer the opportunity for an education with both breadth and depth, taught by faculty members with superior credentials who are involved in important efforts to create new knowledge. An especially interesting finding from the last Graduating Senior Survey that seems to reflect the quality of the Rutgers undergraduate experience is that 85% of Rutgers graduating seniors intend to attend graduate or professional school.

The departments and programs that have won the Rutgers Award for Programmatic Excellence in Undergraduate Education provide examples of the superior manner in which undergraduate education is delivered on all Rutgers campuses. The 1994 recipient of the award was the Department of History, Faculty of Arts and Sciences–New Brunswick. A review of the department revealed a significant commitment of faculty effort to undergraduate education, an extensive teaching evaluation and improvement process, extensive curriculum development activities, and a quality advising system. All members of the department regularly teach at the undergraduate level, and senior faculty members regularly teach large introductory courses. The department's internal regulations allocate no more than one-eighth of total teaching resources to its graduate program.

This department has an extensive program of teaching evaluation and improvement. In addition to using student ratings, the department uses peer observation and review, and is developing a senior exit interview process and the use of teaching portfolios. The department has a permanent Teaching Effectiveness Committee that provides leadership concerning teaching evaluation and instructional development; among its activities is sponsorship of teaching seminars for faculty members. During 1993–94, the department initiated a mentoring program in which senior faculty members are paired with first- and second-year faculty members for peer observation, review, and instructional development.

The department has consistently worked to improve the structure of the major and has initiated a procedure that requires students to set goals when declaring a major in history. The department also has a commitment to high-quality advising. Faculty are responsible for advising coverage; at least one faculty member is on advising duty nearly every day from 10 AM to 7 PM and students can see an advisor on a drop-in basis.

Another Programmatic Excellence Award winner, the Department of Biological Sciences, Faculty of Arts and Sciences–Newark undertook a comprehensive revision of the biology curriculum. The department adopted a set of learning goals and specific methodological and technical skills to be mastered by its students. All members of the department are involved in teaching undergraduate students. The department has acquired over \$5 million in extramural funding to underwrite the development of new undergraduate opportunities such as laboratories and research internships.

The most recent recipient of the award, the Biotechnology Curriculum, Cook College, exemplifies many of the most positive characteristics that can be found in undergraduate programs today. The curriculum is interdisciplinary, drawing on faculty expertise in six departments. Students are given ample opportunity for hands-on state-of-the-art laboratory experience, both in a formal classroom setting and in the research laboratory. All of the students do research, most often at Rutgers, but also through placements in neighboring industrial laboratories. Many students begin research projects in their sophomore year and are able to complete a significant body of work. In addition, students discuss the societal impact of biotechnology, beginning with a freshman seminar course and ending in a “capstone” senior seminar. The program has hosted an NSF Research Experience for Undergraduates Program and has received a grant from the NSF’s Instrumentation and Laboratory Improvement Program. Program graduates have won NSF predoctoral fellowships as well as Howard Hughes Fellowships, and have gone on to prestigious graduate and professional schools.

Comments from students and alumni illustrate the positive impact that this program has had.

- The grueling laboratory requirements allow the student to apply lecture material first-hand.... Not only does this tight coupling between theory and application prepare the student for a career but it allows for the deep understanding needed for problem solving.
- It is a rarity for a team of faculty members to wholeheartedly transfer their passion and love of a subject to their students in the manner that they do. I am grateful that I was blessed with the great resource of excellent teachers.

This report has provided a university-wide review of various areas that have a significant impact on the quality of undergraduate education. Although there are many examples of outstanding undergraduate education throughout the university, a number of issues must be attended to in order to ensure a consistently excellent experience for all Rutgers undergraduates. These issues provide the basis for major conclusions about the directions that Rutgers should take in the coming years.

First, throughout the curriculum there should be an emphasis on the process of discovery. The rapid additions and changes to our current store of information make it necessary that we develop individuals who are able to understand and evaluate the creation of new knowledge and have the expectation that this knowledge will be changing throughout their lifetimes. Rutgers faculty members are highly accomplished researchers, and it is imperative that they communicate their knowledge about the research process to their students. Additional mechanisms to support this type of communication between faculty members and students, such as the Rutgers Undergraduate Research Fellows Program, should be developed.

Involving students in the process of discovery typically necessitates use of active learning modes in the classroom. It is important for faculty members and the administration to work to support active learning in classes. The lecture-only mode of teaching contributes to student passivity and does not assist in the development of individuals who will have the skills necessary to identify and attempt to solve problems in

a variety of settings in their later lives. Students should be expected to be engaged learners, and classes should be structured to support such engagement.

Small class size facilitates use of active learning methods in classes; however, new instructional, information, and computer technologies can also assist faculty members in making their classes settings that support engagement and scholarly activity in students. In the past few years, Rutgers has done much to invest in hardware to support this. “Smart classrooms” have been outfitted across the campuses, and students have access to a number of computer hubs and to email accounts. However, a great deal needs to be done to ensure that the new technology is fully utilized to support undergraduate education. As identified in the RUNet 2000 plan, additional work needs to be done to network the university for voice, video, and data. Just as important, plans need to be developed to ensure that faculty members are fully trained and supported to use the new technologies to improve teaching and learning in their classes. The Teaching Excellence Centers, if staffed adequately, would provide excellent vehicles for accomplishing this.

The prelude to our learning goals indicates that we are educating students to be productive, responsible members of our society who can contribute effectively in the workplace and in our society’s political process. In order to ensure that our curriculum effectively addresses these issues, it is important that we maintain awareness of the demands of the various settings in which our students will be attempting to succeed after graduation. The university must maintain continuous dialogue with those who have contact with our students after graduation, so that we are operating with accurate input about their skills and knowledge in terms of the demands of the postgraduation setting. In this respect, advisory boards with membership from corporations and/or public agencies that employ our students can be useful for many academic units. In addition, more formal, systematic means of assessing the success of our graduates should also be developed and implemented by offices such as Career Services and Institutional Research and Planning. Finally, in our teaching, it is important that we draw connections between the academic disciplines and the larger society so that our students are prepared to make maximum use in their later lives of the knowledge they have obtained while at Rutgers. In this context, expansion of interdisciplinary courses, which focus on the manner in which multiple disciplines are working together to address societal issues, will be important. Expansion of experiential learning through field experiences and internships in corporate and public agency settings can also help to address this issue.

In addition to continuously monitoring the environments which our students will be entering after completing their undergraduate degrees, we need to be fully aware of the teaching and learning conditions they have been exposed to before entering Rutgers. Many changes in terms of curriculum content and pedagogy are occurring and more are being proposed in the K–12 arena. Mechanisms should be developed to monitor these changes so that we can accurately anticipate the knowledge and skill base of incoming students.

Discipline-based dialogue between Rutgers faculty members and faculty members at the community colleges and in the public schools will be necessary to create an educational system in which students experience a smooth transition from one institutional level to the next. At present, substantial numbers of our students are placed in remedial writing and mathematics courses upon entry to Rutgers, in many cases despite good SAT scores and good high school and/or community college grades. Faculty members at all levels of the education system need to engage in discipline-based discussions with the aim of coming to agreement about curriculum content and standards at the various educational levels, in order both to assist

students in progressing through their education and to decrease the numbers of students in need of remediation at the university level.

Many Rutgers faculty members have great expertise in pedagogy related to the various disciplines. Outreach to and dialogue with the public schools should also be increased so that the knowledge our faculty has created about effective pedagogy is fully utilized to educate the students of New Jersey.

We have made numerous efforts to address some aspects of the changing demographics in our student populations. Other sections of this report describe a number of efforts related to cultural diversity. We have not, however, substantially varied the structure through which our undergraduate program is delivered. In large part, it is based on the notion that all students live on campus and are in the 18-to-22 - year-old age range. Additional efforts must be made to address these changes in our student population such as increased evening offerings, weekend offerings, and intersession courses in traditional campus-based formats, and through distance education.

In order to address the issues described above, we are asking faculty members to make a number of major changes in the way they work. We are asking that they change the way they teach to incorporate new pedagogical techniques and new technologies. We are asking them to think about assessment and evaluation in new ways. We are asking them to work with a variety of new constituencies in sustained collaborative efforts to improve the entire spectrum of educational institutions. It is important that faculty members receive appropriate support and incentives to ensure success in these activities. Support for faculty development activities is essential. Training and consultative services should be available in a variety of areas in order for faculty members to make the major changes suggested. In addition, the institutional reward structure—including promotion, tenure, and merit pay—must be examined further, so that these rewards are appropriately linked to faculty efforts to improve undergraduate education.