Industrial internships are an important part of the Rowan Engineering Programs. These internships are designed with industrial partners to provide the optimum learning experience for students as well as research opportunities and industrial contacts for the College of Engineering. Rowan University offers an innovative internship model that involves students, faculty, industrial partners and Career and Development Center staff. This team approach to internships leads to enhanced student development and strong relationships between the University and its industrial partners.

The team approach to internship development has served to enhance students’ technical as well as human relations skills. Workshops designed to enhance student development and marketability include topics such as resume writing, communication skills and team dynamics. The partnership between the College of Engineering and the Career and Development Center is a significant factor in the success of the Rowan Programs. The success of the program is evident by the student and industrial participants program evaluations. To date, 71% of the Rowan Engineering Students have participated in the internship program. The student participation increased with the level of study. Of the junior class, 94% of students participated in the internship program.

Background:

Industrial support and input have been a hallmark of the Rowan College of Engineering from its outset. The College first offered graduate courses in September 1995. Some of these graduate courses were taught at company sites. When the first Rowan undergraduate engineering class arrived on campus in September 1996, the College had already developed partnerships and established numerous industrial contacts in the region.

The National Advisory Council consisting of recognized leaders in engineering education and industry assisted in the initial planning of the College of Engineering beginning in July, 1993. The Corporate Committee of the Council consisted of industrial leaders who assisted in the development of the innovative Rowan Engineering curriculum and had committed their companies to providing industrial experience for Rowan students.

The internship program was a natural development of Rowan's commitment to collaboration with industry. The benefits to students of exposure to engineering practice as part of the curriculum are well documented [Chaplin, 1997]. There are many examples of engineering programs that include industrial projects in the curriculum.
The internship program at Rowan has many unique aspects that benefit students, the College, industrial partners, the University and the community. The Internship Coordinator was hired to coordinate and lead the growth of the program. The Internship Coordinator works exclusively with engineering students.

The Rowan Internship Experience:

The Rowan Internship Program is mostly a summer experience. However, some students work at industrial sites on a part-time basis during the academic year. The program is a unique combination of automated on-line processes and personalized attention to industrial partners and students. This personalized attention is one important reason for the success of the Program. Students and participating companies clearly identify the personal attention they receive as an important reason for their participation and success with the Program.

Most of the processing associated with the Internship Program is carried out electronically. However, the interaction among participating companies, students, and the College is considered essential. The Internship Coordinator meets with every participating company before posting the internship opportunity on the Rowan website. The website posting includes deadlines and all relevant information regarding the opportunity. Students are encouraged to contact the Internship Coordinator with questions. The Internship Coordinator is in a unique position to respond to questions and to match individual students with opportunities because of the strong personal interactions the Coordinator has established with the participating companies and with students. Interested students submit their resumes to the Coordinator. The resumes are forwarded to the participating company. There are some instances when students are asked to submit their resumes directly to a participating company. In general, the process is convenient for students and participating companies. It is also relatively fast and depends on the support that students receive from the College and University. This support is essential for student success in the Internship Program.

In addition to a source of industrial interactions that serves to enhance the academic experience at Rowan University, the internship program is an excellent source of contacts for the College and the University. The Internship Program hosts several events per year aimed at exposing Rowan students and faculty to industrial opportunities in the region. These events are also opportunities for participating companies and prospective industrial partners to interact with students, faculty and College/University administration. They can also tour the state-of-the-art Rowan engineering building and see some of the students' work. Students design and display posters describing their work. The building tour and poster session is very similar to poster sessions in technical meetings. These events give students an opportunity to discuss their work. They also give companies opportunities to see what Rowan engineering students can offer and to interview prospective interns and employees.

The first Rowan Engineering class will graduate in May 2000. As the Engineering Program grows, the internship component will play an even more important
role in the curriculum and student and faculty development. As a result, the Internship Program continues to expand. It now develops and distributes relevant publications to assist students and industry. This includes the Rowan Engineering Resume Book. This publication contains all of the resumes of Rowan students and is made available to all participating companies.

The success of the program is evident from the positive program evaluations by students and industrial participants. Table 1 lists the student participation by year of study and Table 2 lists the student participation by discipline. The overall student participation in the internship program was 71% (13% of students chose not to participate). The level of student participation increased with the year of study. The largest participation by class was for junior students (94%). However, 34% of the first year students had internship positions and received highly positive evaluations. Students in the civil and electrical engineering programs had the highest level of participation (76% and 75% respectively). Overall, the level of participation was excellent for a new program.

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Percentage of Students Participating (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior</td>
<td>94</td>
</tr>
<tr>
<td>Sophomore</td>
<td>68</td>
</tr>
<tr>
<td>First Year</td>
<td>34</td>
</tr>
</tbody>
</table>

Table 1: Student Internship Program Participation by Year of Study in 1998-99

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Percentage of Students Participating (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical</td>
<td>70</td>
</tr>
<tr>
<td>Civil</td>
<td>76</td>
</tr>
<tr>
<td>Electrical</td>
<td>62</td>
</tr>
<tr>
<td>Mechanical</td>
<td>75</td>
</tr>
</tbody>
</table>

Table 2: Student Internship Participation by Discipline in 1998-99

The Internship Program is an integral part of Rowan Engineering and has proven to be a highly successful part of the Rowan Engineering experience. There are several elements that work together to successfully integrate the internship program into students’ academic experience and into the College and University as a whole: the participation of students and faculty, the Career and Academic Planning Center, industry, and the University.
Students and Faculty:

Students participate in the internship program beginning in their first year. The Internship Coordinator, the Faculty, and the Career and Academic Planning Center work together to make certain that the experience is technically and developmentally appropriate for students. Internships provide students with valuable real world experience. When well organized, internships are an enhancement to the academic experience. The Rowan internships have served to show students the importance of classes and laboratories in engineering practice. In addition, they have served to develop and educate students in many areas related to industrial practice that are not available in an academic setting. Student interns work in companies as professionals and gain practical experience. Students learn by doing and from the mentoring by experienced engineers, which is part of the internship experience.

The College of Engineering has received numerous accolades on the performance of its interns. Even first year students, perform above expectations. There are many examples of students working in small companies and in large institutions, such as the Naval Air Warfare Center. Regardless of company size, students learn to handle responsibility quickly and to work in a professional setting. Students leave internships as more mature professionals and with added technical knowledge.

The participation of faculty plays an important role in the success of students. Faculty integrates professionalism and ethics in a highly technical and challenging curriculum. Most courses include team projects. Engineering clinics are required every semester. These clinics are team project courses. Many clinics are funded by industrial partners. The Clinics are a vehicle for teaching students technical material related to their specific project. In addition, they provide opportunities for developing communication and team building skills. Rowan engineering students develop in the classroom and laboratories many of the skills they need in industry. Faculty is mainly responsible for integrating these components into the classroom, laboratories and projects.

The faculty benefits from the Internship Program from the industrial contacts that result in projects, financial and in-kind support, and research opportunities. There have been several examples of additional projects that have been identified by student interns. These projects have developed into clinic projects as well as consulting and research opportunities for faculty.

The Career and Academic Planning Center:

The Career and Academic Planning Center (CAP) provides essential support to the Internship Program. The Center provides assistance with all skills related to professional endeavors. The Center provides workshops in resume writing and interviewing techniques. CAP Center staff, as part of a team with engineering faculty, have incorporated interviewing techniques and resume writing as part of the oral and written communication components required in the sophomore engineering clinics. This
type of team approach in the engineering classroom is unique to Rowan Engineering. The CAP Center also provides additional services to students such as the 72-hour drop-off resume critique service. Students get feedback on their resume from a CAP Center professional within 72 hours. The Engineering Internship Coordinator works closely with the CAP Center and maintains regular contact with the CAP Center staff. This collaboration, in addition to a solid technical curriculum, gives Rowan students a competitive edge in the marketplace and benefits industry.

**Industrial Partners:**

The Rowan Engineering internships are a significant benefit to industry. The participating companies have bright, motivated and highly skilled students to work on projects. This provides companies with a source of engineering talent that can lead to full-time employment offers. Companies have an opportunity to work directly with a potential employee. In addition, participating companies have access to Rowan faculty expertise. Faculty works with companies on specific projects that usually include students. The Rowan College of Engineering continues to expand its industrial partnership programs. Companies of all sizes have partnered with Rowan engineering to obtain the best technical resources from a University while contributing to the development of the next generation of engineers. Rowan partners include among others, the Boeing Defense & Space Group, Conectiv, Dupont, Lenox China, Sony Music, Washington Township Public Schools.

**The University and Community:**

An engineering internship also fosters new relationships for the university and other academic departments. Since many engineering firms are also interested in business, chemical, and computer science support, it is both efficient and essential to share resources between the colleges. An industrial representative is able to disseminate information to any college within the university by contacting the Engineering Internship Coordinator. There is a high level of communication between the Engineering Internship Coordinator and other colleges within the university. In addition, administrative offices such as Admissions, University Relations and Development also participate in engineering internship activities and company relationships.

The community also benefits from engineering internships. For example, Rowan interns at Navy Lakehurst continued their commitment to the Navy and community through project BORN after the conclusion of their summer internship. They helped found the BORN program that teamed Brick High School, Ocean County Community College and Rowan with the Navy. They worked with high school physics teachers to create engineering projects that students developed and then tested at the Navy facility. BORN (now NORM) has grown to include one-on-one, on-line mentoring of high school students by engineering interns. This project, initiated by an engineering internship, continues to grow.
Conclusions:

The integration of the Engineering Internship Program into the curriculum sets Rowan Engineering apart in developing students into professionals. A highly automated processing system combined with personal attention to students and the participating industrial partners are important components of the success of the program. The team based approach between the Engineering Internship Coordinator, Engineering Faculty, and Career and Academic Planning Center staff provides a comprehensive approach to the education of Rowan engineering students. The Engineering Internship Program is a highly successful component of the Rowan Engineering experience. The overall student participation is high, especially considering that it is a new program. The program benefits students, faculty, the College of Engineering and the University. It also provides an important factor in the technological and economic development of the community and the region.

References:
