

# **Waukesha County Technical College and Marquette University Transfer Program Targeted to Underserved Populations in the Field of Engineering**

## Introduction

There is a need to increase the number of women and minority engineers and the number of women and minorities in engineering education [1]. Women accounted for approximately 35 percent of employed engineers between 1993 and 1999, Asians made up about 11 percent, African-Americans and Hispanics each made up about 3 percent and American Indians made up less than 0.5 percent [2]. Although engineering is “gaining in popularity at all degree levels” [3], according to the results of American Society for Engineering Education’s 2001-2002 survey, women and minorities are underrepresented in engineering with women earning engineering degrees at between 17 and 22 percent, and African-American and Hispanic students both represented at less than 5.5 percent at the undergraduate level [4].

In Fall 2002, Waukesha County Technical College (WCTC) received funding through a congressional award for the development of a joint curriculum and transfer program with Marquette University for the fields of engineering (and nursing) to benefit underserved populations [5]. Underserved populations who may benefit include members of minority groups, the financially disadvantaged, people with disabilities and those who consider careers in engineering (and nursing) non-traditional occupations.

## Goals and Outcomes of Model:

The goal for engineering is to increase the number of underserved individuals who persist to completion of an engineering degree. Capitalizing on the existing relationship between WCTC and Marquette University, the following objectives were developed:

1. Establish Advisory Committees to advise and develop strategies and resources to assist with recruitment, support, and retention of underserved students for transfer engineering programs.
2. Integrate program curricula to optimize opportunities for multiple entry and exit points and for students' success and degree completion.
3. Establish collaborative linkages with secondary and post-secondary institutions, business and industry representatives, and community, minority, and professional organizations to recruit, support, and retain students.
4. Enroll 12-15 underserved students to begin a pre-engineering program at WCTC in Fall 2003.
5. Create a detailed plan to replicate this program at other institutions.

## Ways in Which Model will Increase Baccalaureate Participation and Expansion:

This model provides low cost postsecondary education entry pathways to engineering baccalaureate degrees for underserved populations. It also minimizes duplicate credits students must take, decreasing students’ costs and increasing the probability of baccalaureate completion. It also increases the number of Wisconsin minority and non-traditional engineers.

Another goal of this project is to move towards a state-wide model that can be applied to a regional context – one that goes beyond existing mechanical policies aimed only at the transfer of credits, to a system that enables underserved students to understand the broad purposes of a college education, and to learn the skills in purposeful education planning for a career in engineering as they move from two-year to four-year institutions.

#### Evidence of Model's Success:

Transfer agreements designed to make it easy for students to transfer credits have existed between WCTC and Marquette University since 1995. The current agreement allows students to complete their first two years of electrical or mechanical engineering technology at WCTC and then transfer to Marquette University to complete their bachelors degree. Since 1995, over 50 engineering-related students have already successfully transferred from WCTC to Marquette University to complete their bachelors degrees in engineering. There have been increases in:

- WCTC - Marquette Collaboration
- Articulation Agreements
- Active Advisory Committee
- Expanded Business and High School Linkages
- 15 New Engineering Students
- Numerous Prospective Student Presentations
- Academic Remediation at WCTC
- Increased Student Follow-up Services
- Positive Responses from National Conference Presentation

#### Challenges to Model's Success:

The process of transferring degree credit course work from a two-year technical or community college to a four-year institution has historically been difficult for students. Engineering courses with high levels of mathematics (Calculus) and science preparation often result in denial of course credit transfers resulting in extended times to complete a baccalaureate degree.

Individuals transferring from two-year to four-year institutions may be required to start their engineering education over from the beginning. Additional challenges include:

- Student Academic Preparation
- Student Funding
- Student Transportation
- Child Care
- Project Continuation Funding

#### Ways in which Model Relates to Low Income, Minority, and/or Non-Traditional Students:

Individuals may be underserved for a variety of reasons including financial condition, home and family situation, academic setting and cultural/lifestyle obstacles. In addition, engineering can be a rigorous and competitive academic program. These challenges contribute to potential students finding it difficult to realize success. Individuals among underserved populations often find it helpful to study in an educational environment where additional support services are readily available. This program is designed to provide a nurturing environment to assist students to achieve successful outcomes. The congressional award program will help underserved students start their engineering education at WCTC and progress seamlessly through a bachelors degree program at Marquette University.

### Describe the Partners and Their Role(s) in Collaborating on this Model:

A comprehensive plan involving collaboration within and between WCTC and Marquette University personnel was developed. The plan includes services and activities to develop the relationships necessary for breaking down barriers and building bridges to engineering careers for underserved students.

Successful implementation of the plan requires collaboration of individuals at both institutions and the input of an advisory committee consisting of school administrators, teachers, and counselors, as well as representatives from business, professional organizations, and community groups. An abbreviated list of collaborative activities includes:

- Recruit advisory committee members
- Convene Advisory Committee, begin establishment of collaborative linkages
- Begin program curricula integration
- Begin recruitment of engineering students for program
- Purchase and begin distribution of promotional items
- Convene Advisory Committee to review work to-date and obtain feedback
- Enroll students to begin pre-engineering education
- Hire student mentors
- Construct project website
- Evaluate student progress and success
- Evaluate program success using quantitative and qualitative measures
- Develop and disseminate program replication plan

As part of the plan, a shared program tasks matrix was developed including over 125 tasks. Individuals with primary and support responsibilities at both institutions were identified for each of the tasks. Target dates and tangible outcomes were identified.

### Cost/Benefit Analysis or Projection of Cost/Benefit:

Existing resources including space, infrastructure, general studies, and occupational courses are being used. This model seeks to integrate student service systems such as admissions, financial aid, developmental education, and housing, with a net effect of student admission to WCTC constituting admission to Marquette University.

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### References

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[3] Gibbons, M.T., *Engineering on the Rise*, American Society for Engineering Education Profiles of Engineering and Engineering Technology Colleges, 2002 Edition, 2000.

[4] U.S. Bureau of the Census, *Statistical Abstract of the United States: 2000*, Washington, DC., 2000.

[5] U.S. Department of Education Grant Award Number P116Z020207, 2002.