

Programs and Partnerships that Impact Retention

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Abstract— The Michigan Technological University Graduate/Undergraduate Initiative for Development and Enhancement (GUIDE) and ExSEL Programs make use of national best practice techniques, campus and community partnerships, and existing resources to increase the success and retention of participating students.

Both originating in the Michigan Tech College of Engineering and focusing primarily on female and underrepresented minority first year engineering students, GUIDE and ExSEL (launched in Fall 2002 and Fall 2000 respectively) offer academic, financial, and social support through peer mentoring, tutoring and coaching help, scholarships, internship opportunities, one-on-one advising, leadership opportunities, introduction to campus resources, and academic skill development. In order to best utilize existing resources, campus and community collaborations are in place to provide a wide range and diverse offering of student support.

Because enrollment is limited, students are required to apply for program admission which allows participation to be a privilege without the usual stigma attached to other similar programs.

Due to the success experienced by GUIDE and ExSEL, both programs are now employed as recruitment tools not only for the College of Engineering (COE) but also campus-wide.

A detailed explanation and suggestions for duplication will be presented on the best practice techniques and partnerships being utilized. Evidence of increased retention, academic success, campus resource utilization rates, and anecdotal accounts from students will provide additional support of the program's successes.

Introduction

Following national trends, Michigan Tech experienced declining first year retention in the late 1990's. According to ACT, Inc.¹ the average national first year retention rate at four year public institutions fell 2% from the early 1990's to the second half of the decade (75% to 73%). Michigan Tech averaged 87% in the first half of the 1990's, the second half of the decade saw the average retention drop 7%. The Michigan Tech COE did not escape this trend. COE first year retention dropped from an average of 90% to 84% over the same time period. Michigan Tech also experienced small declines in second year retention rates during this time, causing additional concerns. Also, enrollments of females and minorities at Michigan Tech and in the COE, in particular, were remaining steady, despite higher numbers of females and minorities attending college nationally.

In response, Michigan Tech initiated numerous partnerships, outreach efforts, and programs, in

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an effort to attract and retain more students, especially those traditionally underrepresented in engineering. Now, six years later, it is clear that many of these initiatives have indeed served their purpose, increasing student success, retention, and underrepresented student enrollment.

Michigan Tech's first and second year retention rates have rebounded from their lowest point in 2001, both at Michigan Tech as a whole and in the COE (Table 1). While the percent of females enrolled at Michigan Tech has remained steady, the percent of underrepresented minority students (African American, Native American, and Hispanic/Latino) has increased each year, from 2.7% of the total enrollment in 1995 to 4.1% in fall of 2006. Campus-wide, the percent of students on academic probation is down 11% from 1999. Over this same time period first year students have shown improvement also: the percent of first year students academically dismissed dropped 2%, the percent on academic probation dropped 1%, and the percent earning a GPA of less than 1.00 decreased from 13% to 7%.

Table 1: Michigan Tech First- and Second-Year Retention

	Retention Rate			
	First Year		Second Year	
	2001	2006	2001	2005
Michigan Tech University-wide	75.5%	80.7%	81.7%	88.8%
College of Engineering	80.7%	84.2%	85.2%	92.0%

Best Practice Overview

As noted by Vincent Tinto² in 1993, institutions were beginning to appreciate, as never before, the necessity of retaining students. The onslaught of research on successful retention practices during this time enabled best practice techniques to emerge. In 2004, ACT, Inc.¹ published a study explaining that practices responsible for the greatest contribution to retention in four-year public college's fell into three main categories: academic advising, first-year programs, and learning support, supporting much of what Tinto told us a decade earlier.

Looking at minority retention, Raymond Landis³(2005) showed that implementation of a successful minority retention program should include collaborative learning communities, first-year cohort scheduling, and a first-year seminar focusing on study skills, time management, student organization involvement, and faculty and peer interaction. Also looking at minority retention in 2005, Gaither⁴ noted that educational programs and institutions need to teach students to cope with racism, provide mentoring programs, promote community involvement, and improve the environment for minority students. *The National Resource Center For The First Year Experience & Students In Transition*⁵ includes learning communities, mentoring programs, thematically linked courses, validating in- and out-of -class environments, and connections among faculty, students, and peers as key programs to foster student retention.

The significant body of retention research that has emerged in the past decade is well summarized by The National Action Council for Minorities in Engineering (NACME) list of best practices in retention developed at a 2004 NACME Partner Meeting (www.nacme.org):

- Summer programs designed to support academic excellence
- An extended orientation program
- Cohorts of learner communities

- Faculty/Student mentor program
- Clustering of students to support effective study groups
- Undergraduate student research opportunities
- Financial counseling
- Offer aggressive first year programs
- Student drop-in centers
- Effective academic advising
- Provide nonacademic advising
- Faculty incentives for effectively supporting student success
- Involve families in student advisement
- Set high goals and expect success from all students (make this explicit during student advisement)
- Facilitate special affinity groups
- Help with internships/co-ops

The following list of retention practices at high performing (retention and degree completion) four-year public colleges from ACT, Inc.¹ provides added best practice techniques.

- Advising intervention with selected student populations
- Increased advising staff
- Comprehensive learning assistance center/lab
- Integration of advising with first-year programs
- Center that combines academic advising with career/life planning
- Summer bridge program
- Non-credit freshman seminar/university 101
- Recommended course placement testing
- Performance contracts for students in academic difficulty
- Residence hall programs
- Extended freshman orientation for credit

History

Michigan Tech has an extensive history of student outreach and success initiatives. While this paper will focus on two, ExSEL and GUIDE, which will be described later, a short history of other campus efforts is needed to better understand the campus commitment to student support.

Several programs have been implemented through the Michigan Tech Project RISE (Retention Initiative in Science and Engineering) to increase the retention of students and underrepresented groups in particular:

- A series of Efficacy workshops were held providing intensive faculty development to improve classroom climate and learning. Over 150 faculty participated.
- Development of collaborative learning groups in the Writing and Math Learning Centers.
- A Peer Academic Leader (PAL) program. PAL was never fully adopted although components have been incorporated into the current first year orientation program.
- An Engineering Learning Center was created and each year a number of minority student facilitators work with faculty to provide academic support for their peers.

- An on-campus faculty development activity was conducted by NACME. This resulted in a University-wide Framework for Diversity strategic plan that includes recommendations and action items to increase student-faculty interactions as well as recruit and retain greater numbers of faculty, and graduate and undergraduate students of color.
- An undergraduate research program was initiated that focused on matching underrepresented students with faculty to work on summer research projects. A Spring Research Symposium was added to highlight the student work, provide role models, and promote the research opportunities for minority students.

As a result of the success of the learning centers established through Project RISE, Michigan Tech now has learning centers in Chemistry, Civil Engineering, Computer Science, Electrical Engineering, Mathematics, Physics, and Engineering (Statics, Dynamics, Mechanics of Materials). In addition, the University has the MTU Writing Center, Modern Language Learning Lab, Center for Computer-Assisted Language Instruction, and tutoring services.

Michigan Tech's common first year engineering program schedules students in cohorts (20-24 students enrolled in the same Engineering, Calculus, and Physics courses). Assignments in the first year engineering program are active, collaborative, and discovery based.

In the 1990's faculty and staff committees researched the academic advising structure, resulting in the current advising arrangement. There are both faculty and professional academic advisors based out of each academic unit. Oversight and training are provided by Student Affairs in order to ensure consistency and collaboration among the campus student support professionals.

During this same time period, the Center for Teaching, Learning, and Faculty Development was created. The center offers individualized advice and assistance to MTU faculty members seeking to improve areas of their instruction through review of student instruction ratings, review of course materials, syllabi, and course assessment instruments, classroom visitations, or videotaping. They also offer faculty workshops focusing on emerging issues for instruction, several of which are offered in conjunction with the ExSEL Program.

GUIDE Program Description

In 2002, Michigan Tech received a National Science Foundation Grant to start the GUIDE (Graduate/Undergraduate Initiative for Development and Enhancement) program. This scholarship program was implemented to support first and second year engineering students through mentoring and guidance. Over the past five years, GUIDE has awarded 91 scholarships to 56 different undergraduate students. The program focuses on funding students who not only are underrepresented in engineering but also do not typically qualify for academic scholarships due to high school performance and/or high school coursework.

Students are actively recruited for the program through high school recruiter visits, Michigan Tech website advertisements, and direct mailings to targeted students. Students are also referred to the program by the Financial Aid Office, ExSEL Program staff and Engineering Faculty.

Each year three groups of students participate in GUIDE: first year students (undergraduate student mentee), second year students (undergraduate student mentor), and graduate students

(graduate student mentor). The first year, second year and graduate students are grouped into mentor teams, where each first year student has a second year and graduate mentor. The graduate mentor acts as team leader and mentor to both the first year mentee and second year mentor. The undergraduate student mentees that successfully complete their first year become undergraduate mentors for new first year students. Because the graduate mentors typically complete their coursework and leave for their Peace Corp International assignment, each year there has been a new group of first year mentees, and graduate mentors.

Each semester, the undergraduates participating in the program meet twice a week with their graduate mentors. The mentors informally monitor student academic progress, and assist the students in the successful completion of their courses.

As part of the GUIDE program, all scholars attend weekly GUIDE Seminars throughout each semester. Each year, the seminars have varied depending on the requests and needs of the students. Seminars have included Engineering faculty, campus staff, and community members talking with the students about Graduate School, Undergraduate Research, Study Abroad, Engineering Professionalism/Ethics, introduction to the Career Center and other campus resources, career planning, and other topics. Due to student requests, there are 2-3 seminars each semester where scholars participate in activities to become better acquainted with the other GUIDE teams. Students also attend the fall and spring on-campus career fairs where they meet with prospective employers and submit their resumes. GUIDE Seminars and the program as a whole are assessed at the end of each semester; feedback is used to determine future seminars and re-evaluate the program goals and initiatives.

The undergraduate scholars create and maintain an academic graduation plan in consultation with their academic and GUIDE advisors. The students are required to maintain a minimum GPA of 2.5 and show reasonable progress towards their degree for the duration of their participation in the program. To help these students strengthen their academic career and professional development, they join and participate in an engineering society or other approved student organization. Scholars attend a bi-annual evaluation interview with their mentors and one of the program advisors in order to assess both their academic and professional development. The purpose of these meetings is to encourage the student in areas where progress has been made and to point out areas where the student needs to improve.

Over the course of the program, the students participating have changed. During the first two years, more scholars were enrolled in Calculus I or higher and therefore were more prepared for an engineering curriculum. In 2004-5 and 2005-6, more at-risk students qualified for and were accepted into GUIDE. At-risk is defined as students starting in either developmental math or pre-calculus. Although, the number of at risk students participating in GUIDE has increased, the GPAs for the GUIDE undergraduates have in many cases exceeded the COE average (Table 2).

The GUIDE undergraduates have been actively working towards their career goals (Table 3). Anecdotal evidence suggests this is a result of the GUIDE peer mentoring and seminars. Since the program began, approximately 57% of the undergraduates have worked on-campus during the academic year, many for more than one year. The students have actively sought and obtained Co-ops and Internships and participated in the Michigan Tech Enterprise program at a higher rate

than the Michigan Tech College of Engineering average participation rates. We have several students who have explored research opportunities both on campus and at other universities. Many of these scholars have completed REUs (NSF Research Experiences for Undergraduates). The undergraduate scholars are voluntarily participating in the ExSEL program. These students receive mentoring and academic counseling through both programs.

Table 2: GUIDE and College of Engineering Scholar Data

	Average Cumulative GPA after Spring Semester	
	GUIDE	College of Engineering
2002-03		
First Year	2.95	3.07
Undergrad Mentor	3.36	3.04
Grad Mentor	3.64	3.63
2003-04		
First Year	3.39	3.09
Undergrad Mentor	3.30	3.03
Grad Mentor	3.48	3.62
2004-05		
First Year	3.06	2.98
Undergrad Mentor	3.32	2.91
Grad Mentor	3.51	3.61
2005-06		
First Year	2.52	2.83
Undergrad Mentor	3.37	2.84
Grad Mentor – Spring	3.66	3.65

Table 3: Undergraduate Participation in Career Development Activities

Career Development Activity	GUIDE	COE
Work Study	57%	45%
Co-Op (National Average: 9%)	15%	12%
Internship	35%	N/A
Study Abroad	2%	2%
Enterprise w/o 2005 and 2006 1st yr GUIDE students	20%	10%
Research	11%	N/A
ExSEL Student	26%	11%

Although maintaining a retention rate of over 90%, like all scholarship programs, students have left the GUIDE program for various reasons. Of the 11 students who left, most are still in a math/science/engineering field either at Michigan Tech or another university. The two students that left the program due to academic performance are still at Michigan Tech and working towards their engineering degrees. One student left Michigan Tech for personal reasons (i.e. homesick, wanted to live in larger city) but is still pursuing an engineering degree. Over the five years of the program, seven students decided to leave CSEMS (STEM) fields. These students spent much time discussing their decision within their mentoring team and with the GUIDE PIs.

The students who left the GUIDE program stated that the program greatly helped them and provided guidance deciding whether to stay or leave campus and/or engineering.

GUIDE utilizes a number of best practice techniques: creating faculty, graduate student, and peer mentoring relationships; providing both academic and non-academic advising; financial assistance; promoting and supporting the needed efforts to obtain co-ops, internships, research and other alternative opportunities (such as Study Abroad or National Student Exchange). In addition, through the informal monitoring and semester grade reviews, intervention happens in a timely manner. Support groups and a larger sense of campus community are developed through the undergraduate requirement to join a professional organization. The Seminars enable students to have a better understanding of the different campus resources and support.

ExSEL Program Description

Developed in 2000, the ExSEL Program is a partnership between the Michigan Tech Department of Educational Opportunity and the State of Michigan's King-Chávez-Parks Initiative. The program serves approximately 150 students each year, focusing on academically or economically disadvantaged students. ExSEL's strategy combines coursework, peer mentoring, progress monitoring and personalized services to help assure the success of student participants.

While originally targeted towards certain students, ExSEL actually provides support for a wide variety of students. This, combined with stressing the importance of utilizing support regardless of the academic background, enables ExSEL to escape the stigma often associated with student support initiatives. Students are recruited in a similar fashion to GUIDE, utilizing referrals from across campus as well as outside organization partnerships. ExSEL also contacts incoming first-year students and parents to make them aware of the opportunity; parents are often surprised and happy to know this type of support structure exists at Michigan Tech.

Progress monitoring is a critical component of the program. A contract that includes a grade release is completed before the student enters the program. This release allows for review of grades at the fourth week of the semester (generally when first exams are given) and again at mid-term as well as allowing ExSEL staff to discuss student progress with parents/guardians. ExSEL, GUIDE, First Year Programs, Judicial Affairs, and Residence Life maintain contact to coordinate our efforts in helping students which provides another means of receiving an early signal that a student may need assistance. This provides multiple opportunities to contact students and direct them toward assistance before their academic situation becomes irreversible. The ExSEL program offers multiple options for support, including pairing students with an ExSEL program mentor, referring them to campus resources or study sessions and having one-on-one meetings to discuss their current course of action for achieving success, as well as referrals to other existing campus resources.

The peer mentoring portion of the program involves both volunteer and paid mentors or tutors. The mentors' primary responsibility is to provide direction, encouragement, and academic support (as necessary). Partnerships with student organizations have provided collaborative opportunities. Initially student organizations such as the National Society of Black Engineers, and the leadership organization Omicron Delta Kappa, volunteered members to serve as mentors, providing engaged upperclass students to serve as role models for at-risk first-year students. Peer

mentors offer opportunities for the first-year students to learn about groups at Michigan Tech and develop relationships with upperclass students. This process has continued more informally in recent years; all mentors are active in some organization or group on-campus, and referrals for future mentors generally come from current mentors. ExSEL and GUIDE both require mentor training, partnering to offer two sessions at the beginning of each year. Mentors from each program can choose to attend either session. Rather than duplicate efforts, the mentor training was first developed by ExSEL and then shared with GUIDE Program Advisors.

ExSEL's strategy for improving student performance is through the use of in-place campus resources. This includes utilizing established resources including the Outreach and MultiEthnic Program Coordinators, Academic Learning Centers, student organizations, Counseling Services, and Michigan Tech's Office of First-Year Programs. Communication with these established campus resources reduces duplication of efforts. For example, if a student can receive adequate tutoring from a learning center instead of from an ExSEL peer mentor, it frees that peer mentor to tutor students for whom the Learning Centers are not a good fit. Strategies for student outreach are often discussed, and in collaboration with the others, one area will take the lead. Outreach and MultiEthnic Coordinators, Counseling Services, GUIDE Advisors, and First-Year Programs regularly refer students to ExSEL.

A new ExSEL outreach initiative beginning Summer Semester 2007 involves placing ExSEL students as Interns in local community businesses. Working in conjunction with the Keweenaw Economic Development Alliance, three ExSEL students will be chosen via application for paid part-time (20 hours per week) internships in their area of study. This allows students to stay on campus to take classes during the summer semester and gain experience in their field early in their college career while also becoming more integrated in the local community.

Participants are required to enroll in the *Frameworks for Success* (UN1000) course which focuses on the tools necessary for first-year success. It is a one credit graded course and includes such topics as time management, academic skill development, and introduction to campus resources. Initially, ExSEL students were required to participate in ENG1001, *Engineering Applications in Precalculus*, a course that was paired with Precalculus as a co-requisite to illustrate real world applications of the mathematics tools they were learning. During the 3 years the course was part of ExSEL, roughly 14% more students passed Precalculus with a C or better grade. The notable level of student success that stemmed from this course prompted institutionalization by the COE, and it is no longer ExSEL program specific.

ExSEL supports two websites: the ExSEL Resource site, devoted to program information, links to first-year math practice exams, campus resources, success tips, and other relevant areas (<http://www.exsel.mtu.edu/>), and Making Our Mark @ MTU, a site devoted to success stories from students with diverse backgrounds (<http://www.exsel.mtu.edu/makingourmark>). ExSEL, GUIDE, First Year Programs, the Writing Learning Center, and other campus areas utilize this site to introduce and increase dialogue about the difficulties different students face.

ExSEL was designed to address barriers to success for economically or educationally disadvantaged first-year students enrolled in the COE. It has proven so effective for participants it also provides support for several special scholarship programs such as the NACME Block

scholars, Wade McCree Scholars, Detroit Compact Scholars, and students enrolled in Michigan Tech's community college partnership program, Michigan College/University Partnership (MICUP). Combining ExSEL services with other recruitment and academic enrichment programs improves students' professional development and academic success, and an even broader range of students now benefit from the program.

There are several professional development seminars funded by ExSEL each semester. To make the best use of their time on campus the presenters meet with ExSEL and GUIDE students, hold faculty or staff sessions, and provide sessions for students campus-wide.

Honored as a Noel-Levitz Retention Excellence Award winner in 2006, ExSEL has experienced considerable evidence of success since program inception (Fall 2000). Most noteworthy is the increased ExSEL student retention. ExSEL student retention has increased over 26% and ExSEL Engineering student increased over 28%, while University-wide and COE first-year retention rates have experienced 5.2% and 3.5% increases respectively during the same time period. In fact, both the ExSEL student and ExSEL Engineering student retentions exceed the University and COE retentions for the 2005-06 first-year student cohort (Table 4).

Table 4: First-Year Retention Comparison

First-Year Retention Rates	Students					
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
ExSEL	62.5%	75.6%	83.1%	78.9%	75.8%	88.9%
ExSEL Engineering	59.1%	76.2%	83.7%	79.3%	75.0%	87.6%
University-wide	75.5%	77.6%	80.8%	81.0%	80.2%	80.7%
College of Engineering	80.7%	81.9%	85.2%	83.7%	83.0%	84.2%

ExSEL students have experienced increased semester GPA's. The ExSEL student Fall Semester average GPA has increased 31% (1.99 to 2.60) and Spring Semester 16% (2.17 to 2.52) since program inception (Fall 2000 to Fall 2005). In comparison, during the same time period the university has experienced a 0.7% decrease in Fall Semester first-year student average GPA and a 7% increase for Spring Semester. The COE has experienced a 7% Fall and 12% Spring increase. Additionally, 16% fewer ExSEL students experience academic probation and 8% more are on the Dean's List during their first year. There has also been a percentage increase of ExSEL students earning a C or better in their first attempt at challenging subjects: 60% in General Chemistry, 57% in Precalculus and 54% in Calculus 1.

The ExSEL Program conducts a post-survey each spring semester; students are asked about their ExSEL experience, as well as their overall first-year experience. The feedback is used to make program changes such as adding different professional or academic skills seminars, hiring additional tutors, and setting up more study groups for certain subjects. The information is shared with First-Year Programs and Student Affairs. The Frameworks for Success course is assessed via the Michigan Tech course evaluations with student comments taken into account for course changes. Because of the partial grant funding, staff, mentors, and tutors keep records of student and parent contacts.

The ExSEL program was created with national best practice techniques in mind. For example, the *Frameworks for Success Course* serves as an extended orientation while also teaching the academic skills needed in college. Between the course and study groups set up by ExSEL peer mentors, students develop a cohort of peer support. Through the various ExSEL professional development seminars students become familiar with and are offered support to pursue opportunities such as Undergraduate Research, Graduate School, Study Abroad, National Student Exchange, and Enterprise early in their academic career. ExSEL staff hold regular office hours to facilitate a walk-in atmosphere for student help, and provide an additional route for advising, working with students themselves or referring students to their academic advisor, counseling services, the career center, or learning centers. The ExSEL contract provides a route for both involving the parent or guardian in the student support as well as holding the student accountable for seeking the recommended support.

Conclusion

While both of these programs focus on students in the Engineering fields, components could easily transfer to a wide variety of majors, as ExSEL has for the 2006-07 academic year. The components of all of the different student support initiatives at Michigan Tech are designed to work together to form a synergy for student success. GUIDE and ExSEL are stronger programs and their students more successful in large part due to collaborative efforts and use of existing Michigan Tech services. Many institutions have a plethora of student support services in place. Therefore, the challenge may not be new offerings, but developing an organized system to encourage and assist students in utilizing the services currently in place.

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