

Self-Study Report

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How to Read this Report

In 1994, Michigan Technological University (hereafter referred to as Michigan Tech or MTU) embarked on a new strategic planning process designed to increase the involvement of multiple University constituencies in planning for our future. After significant deliberation, we chose eight strategic goals to guide us in accomplishing our mission and vision. The self-study process required for reaccreditation by the North Central Association of Colleges and Schools (NCA) provided us an opportunity to examine this strategic planning process and evaluate our progress toward the eight strategic goals.

Accordingly, we have designed our Self-Study Report around our eight strategic goals as well as around the five NCA criteria. We begin in Chapter 1 with an overview of Michigan Tech, including a response to concerns identified by the 1988 NCA Evaluation Team. In Chapter 2, we examine Criterion 1: Purposes. We proceed in Chapters 3–12 to examine the eight University goals (including two subgoals), with particular attention to the ways in which accomplishing these goals address all five NCA criteria. Accordingly, we have organized each "goal chapter" around the five criteria, abbreviated as follows: Purposes, Resources, Accomplishments, Continuous Improvement, and Integrity. Each goal chapter concludes with an analysis of strengths, weaknesses, opportunities, and threats related to that goal, and an action plan for addressing them. Because we are developing our distance education potential, we dedicate Chapter 13 to a request for approval for institutional change.

These 13 chapters lay the groundwork for an overall evaluation in Chapter 14 of how well we meet the five NCA criteria. We conclude in Chapter 15 with an analysis of our strengths, weaknesses, opportunities and threats, and an action plan for integrating the results of this self-study process into our strategic planning process.

Addressing the GIRs and Criteria for Accreditation



The General Institutional Requirements (GIRs), Basic

Institutional Data forms (BIDs), and Federal Compliance Requirements constitute separate appendices (1, 2, and 3, respectively) to this report.

The Self-Study Process



The self-study process is discussed in detail in Chapter 1. A chart that outlines the structure and committee memberships for the self-study process appears in Appendix 4. A Resource Room was created to house documents gathered by various self-study committees and utilized in their reports. Appendix 5 presents the Resource Room classification system used throughout the self-study to identify the location of documents available for review on campus. Documents will be identified by number in brackets—for example, the Strategic Planning Document is identified as [2.1D1].

Because we have not organized this report around University departments, colleges, or schools, we provide self-study reports prepared by the five colleges and schools and the Office of Research and the Graduate School in Appendix 6. In addition, each academic and administrative department in the University conducted a self-study, and their reports are available in the Resource Room [2.6]. Extensive reports on each University goal, prepared by University Goal Committees, are also available in the Resource Room and on the world-wide web (WWW) site.

While we have endeavored to provide a Self-Study Report which is readable and concise, we recognize the limitations of print media in an electronic age. We invite you to read a more dynamic and graphic version of this report, with links to many university web sites which tell Michigan Tech's story in pictures as well as words, at <http://www.admin.mtu.edu/admin/nca/report>. We will rarely, however, cite specific WWW links in this printed report, for editorial reasons. To access our Self-Study web page directly, please go to <http://www.admin.mtu.edu/admin/nca>.

Two comments on editorial decisions are in order:

- We have identified departments as follows: Human Resource, Information Technology, etc.
- We have adopted the following conventions for years: academic year 1995/96; fiscal year 1995/96; multiple years 1995–97.





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A



AAC&U

American Association of Colleges and Universities

AACSB

American Assembly of Collegiate Schools of Business

AASCU

American Association of State Colleges and Universities

ABET

Accreditation Board for Engineering and Technology

ACS

American Chemical Society

ACT

American College of Testing

ACUS

AT&T College and University Solutions

ADDOC

AFSCME

American Federation of State, County, and Municipal Employees

AISES

American Indian Science and Engineering Society

APEX

ASCE

ASF

assignable square feet

AT&T

American Telephone and Telegraph Company, Inc.

ATLAS

B



BANNER®

MTU's Administrative Records Database
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BID

Basic Institutional Data forms

BSA

Black Student Association

BSE

Bachelor of Science in Engineering

BSS

Bachelor of Science in Surveying

BYO

bring-your-own

C



C2E2

Century II Endowment Equipment

CAC

Computer Advisory Committee

CAS

Council for the Advancement of Standards

CAFR

Combined Annual Finance Report

CEC

Computer Executive Committee

CenCITT

Center for Clean Industrial and Treatment Technologies

CFO

Chief Financial Officer

CIEE

Council on International Education Exchange

CTLFD

Center for Teaching, Learning, and Faculty
Development

E



EDS

Electronic Display System

EEOC

Equal Employment Opportunity Commission

EISI

Endeavor Information System, Inc.

EPA

Environmental Protection Agency

ESI

Education Support Institute

ESL

English as a Second Language (programs)

ETS

Educational Technology Services

EUP

Extended University Programs

F[Top](#)

FTE

full-time equivalent/employee

FTEF

full-time-equivalent faculty

FYES

fiscal-year-equivalent student

G[Top](#)

GA

graduate assistant (or assistantship)

GEM

Groundwater Education in Michigan

GIR

General Institutional Requirements

GMAT

Graduate Management Admissions Test

GPA

grade point average

GRA

graduate research assistant (or assistantship)

GRE

Graduate Records Exam

GSC

Graduate Student Council

GSF

gross square feet

GTA

graduate teaching assistant (or assistantship)

H

 Top

HR

Human Resources

I

 Top

IIE

Institute for International Education

IPEDS

Integrated Postsecondary Educational Data System

IPO

Intellectual Property Office

ISDN

industry standard data network

ISEP

International Student Exchange Program

IT

Information Technology

IWR

Institute for Wood Research

J

 Top

JRVP

J. Robert Van Pelt (Library)

K

 Top

KAIST

Korea Advanced institute of Science and Technology

L



LLP

limited liability partnership

M



MITN

Michigan Information Technology Network

MPTF

Minority Programs Task Force

MSPS

Michigan Society of Professional Surveyors

MSPSER

Michigan State Public Service Employees Retirement
(Fund)

MTSF

Michigan Tech Student Foundation

MTU

Michigan Technological University

MUB

Memorial Union Building

N



NCA

North-Central Association of Colleges and Schools

NCA-CIHE

NCA Commission on Institutions of Higher Education

NCAA

National Collegiate Athletics Association

NCBI

National Coalition Building Institute

NIH

National Institutes of Health

NOC

Network Operations Center

NSBE

National Society of Black Engineers

NSE
National Student Exchange

NSF
National Science Foundation

NTU
National Technological University

O

[Top](#)

ODK
Omicron Delta Kappa

OIP
Office of International Programs

ORAU
Oak Ridge Associated Universities

P

[Top](#)

PAL
Peer Academic Leader

PCD
Presidential Commission on Diversity

PCW
Presidential Commission for Women

PI
principal investigator

POA
Police Officers Association

PPO
Preferred Provider Organization

R

[Top](#)

R&D
research and Development

REF
Research Excellence Fund

RISE
Retention Initiative in Science and Engineering

ROTC

Reserve Officer Training Corps

RTF

Retention Task Force

S

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SAE

Society of Automotive Engineers

SAS

Systems Administration Service

SAF

Society of American Foresters

SBIR

Small Business Innovative Research

SCOLA

Satellite Communications for Learning

SDC

Student Development Complex

SS&E

supplies, services, and equipment

SWOT

strengths, weaknesses, opportunities, and threats

T

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TA

teaching assistant (or assistantship)

TIAA-CREF

Teachers Insurance and Annuity Association-College Retirement Equities Fund

TCP/IP

telecommunications protocols/Internet protocol

TIP

Training Improves Productivity (teams)

TQE

Total Quality Education c

UAW

United Auto Workers

UK

United Kingdom

USDA

United States Department of Agriculture

USFS

United states Forest Service

USG

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WICHE

Western Interstate Commission on Higher Education

WWW

world wide web

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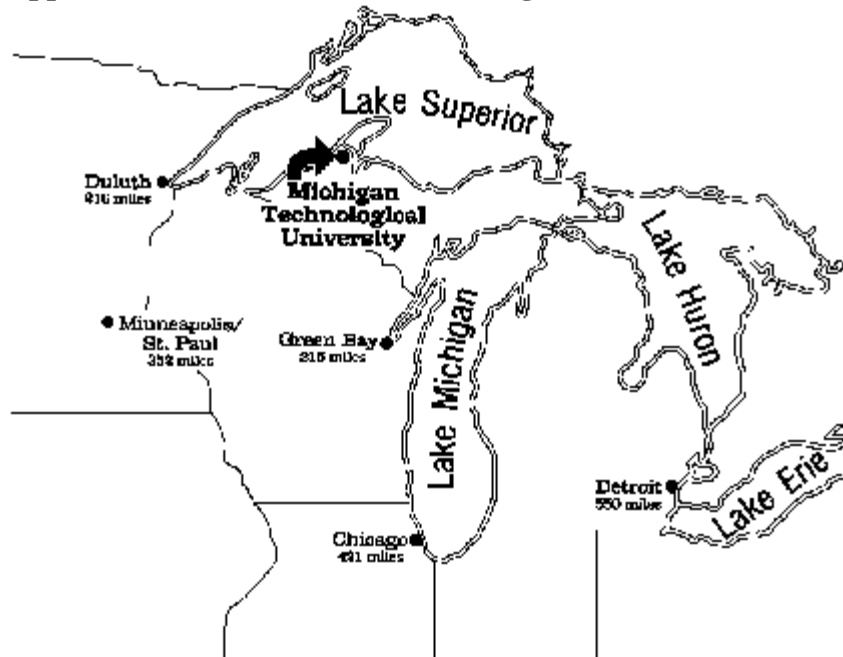
Institutional Overview and Context

Michigan Tech is a public university committed to providing a quality education in engineering, the sciences, business, technology, communication, and forestry at an affordable cost. We are the only public PhD-granting, nationally-ranked technological university in Michigan. Our unique tradition of education in engineering, science, and related disciplines provides Michigan's industries with highly qualified graduates, and our research activities assist the community, the State, and the nation in economic and cultural development.

Location

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FIGURE 1. Location of the Michigan Tech Campus in the Upper Peninsula of the State of Michigan.



Michigan Tech is located in the Upper Peninsula of Michigan on the shore of Portage Lake, one mile from downtown Houghton in the heart of the scenic Keweenaw Peninsula (Figure 1). This location has powerfully shaped the mission of the University. At the turn of the last century, the Keweenaw was the heart of a booming copper-mining industry, and Michigan Tech was created by the State legislature to serve this industry. This legacy of

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service to industrial development, and particularly to the development of natural resources, is embedded in the University's mission and remains a core activity for all colleges and schools in the University. Today the Keweenaw is the site of the newly established [Keweenaw National Historical Park](#) which commemorates copper mining life. Studying the relationships between science, technology, and society has been a unique focus of the liberal arts at Michigan Tech.

The Keweenaw is also the gateway to [Isle Royale National Park](#), an International Biosphere Reserve which encompasses 850 square miles of wilderness and water. Nearby Lake Superior is the world's second largest freshwater lake, surrounded by forests, rivers, and superb geological formations. While these features provide excellent resources and an invigorating physical environment in which to live, they also shape Michigan Tech's many initiatives in environmental studies.

Our remote location and cool climate have contributed to the development of a compact main campus, which consists of 50 buildings and a 352-unit apartment complex on 200 acres. Total local University facilities comprise 60 buildings on 900 acres, this includes an Alpine ski hill, Nordic ski trails, and an 18-hole golf course. In addition, the University owns the Ford Forestry Center in Alberta, Michigan, 40 miles south of campus, with its 4,000-acre forest and 36 buildings. A benefit of our location is safety. Michigan Tech was rated the safest public university campus in Michigan and among the top ten in the nation [1]. For a tour of our campus, please see <http://www.mtu.edu/mtuinfo/narrate.html> or the [MTU Viewbook](#).

History

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Michigan Tech began its history in 1885 as the Michigan Mining School, created by an act of the Michigan Legislature. With a mission to train mining and metallurgical engineers for the local copper and iron mines and to develop the mineral wealth of the Upper Peninsula, the School began with four faculty members and 23 students. In 1896 it became the Michigan College of Mines and trained nationally and internationally recognized mining engineers. To meet the needs of Michigan's rapidly growing mass production industries, the College developed new programs in chemical, electrical, civil, and mechanical engineering as well as in forestry, and changed its name in 1926 to the Michigan College of Mining and Technology. By 1931 enrollment reached a peak of 591. "Michigan Tech" as it was now dubbed, graduated its first woman student in 1933 and awarded its first doctorates in 1934.

In the postwar period the college grew dramatically; it enrolled 1,789 students in Houghton in 1948, and 384 at a new branch campus (now Lake Superior State University) 250 miles east at Sault Saint Marie. New programs in engineering administration,

physics, and geological engineering were introduced. In 1954, the Ford Motor Company gifted Alberta, Michigan, a Ford forest operations center with an experimental sawmill, to the college, and it became the Ford Forestry Center, which provides assistance to local forest products industries.

By 1963, enrollment had reached 2,700, but only 44 students were enrolled in mining. As a reflection of the breadth of the curriculum and the diminished role of mining, in 1964 the State legislature renamed the college Michigan Technological University, granting it university status and expanding its constitutional authority. Over the next 15 years, the development and execution of a long-range campus plan created the physical plant we enjoy today: A central campus mall with high-rise buildings and an upper campus with the Forestry Building and the Student Development Complex (SDC), which includes the MacInnes Student Ice Arena and Gates Tennis Center. Physical expansion has mirrored a growth in curricula. New programs were developed in biological sciences, computer science, forestry, engineering and teacher education. In 1968 the Board of Control divided the University into the College of Engineering, College of Sciences and Arts, and School of Forestry. In 1970 and 1982, the Schools of Business and Engineering Administration (now Business and Economics) and Technology, respectively, were upgraded from their status as departments. By 1979, enrollment reached 7,690 students and faculty numbered about 300. The number of faculty who hold doctoral degrees grew and research funding doubled, presaging a new period of growth in graduate education and research in the 1980s and 1990s.

MTU celebrated its centennial in 1985, and launched the Century II Capital Campaign. “Spheres of Excellence” were identified in undergraduate engineering and science; materials and material processing; computer-aided engineering; forest, biotechnology, and natural resources; environmental engineering/science; wood products development; manufacturing; and scientific and technical communication. By the end of the 1980s, annual giving topped \$1.8 million, and research funding exceeded \$10 million annually.

In 1983, the Michigan Governor’s Commission on the Future of Higher Education named Michigan Tech as one of the State’s four nationally recognized research universities, along with the University of Michigan, Michigan State University, and Wayne State University. This recognition brought with it the significant fiscal advantage of allowing the University to receive supplemental line item research funding from the State of Michigan in addition to its regular State appropriations. In 1996/97, Michigan differentiated its 15 public institutions by Carnegie classification (research, doctoral, and masters/comprehensive; see Table 1) and established per student “floor funding” levels (minimum per student funding levels for each classification); for a complete discussion of this new system, (Fiscal Year 1996–97 Higher Education Appropriations Report

[4.5C], pp. 2–3). Michigan Tech is currently classified Doctoral II, although we have achieved the threshold for Doctoral I status. When we meet the requirements for classification as a Research II institution (projected for the year 2000), we anticipate a significant increase in state funding.

TABLE 1. 1994 Carnegie Classification of Higher Education.

Category	Requirements (3-year annual average)
Research I	50 Doctoral degrees and \$40 million in Federal R&D money
Research II	50 Doctoral degrees and \$15.540 million in Federal R&D money
Doctoral I	40 Doctoral degrees in 5 or more fields
Doctoral II	20 Doctoral degrees in 1 field or 10 Doctoral degrees in 3 or more fields
Masters I	40 Masters degrees in 3 or more fields
Masters II	20 Masters degrees in 1 or more fields



Michigan Tech Today

We continue to build on our mission to benefit the State and society through education, research, and public service in science, engineering, and related disciplines. Our vision encompasses developing leaders and communicators who understand the growing diversity of our society, the global reach of industry and its impact on the environment, and the increasing complexity of science and technology. This complexity demands depth of education at the graduate level and interdisciplinary approaches, two aspects of our vision which continue to grow in importance (see [Chapter 2](#) for more information).

Today the University is organized into two colleges and three schools:

- [College of Engineering](#),
- [College of Sciences and Arts](#),
- [School of Business and Economics](#),
- [School of Forestry and Wood Products](#), and
- [School of Technology](#).

In addition to offering degree granting programs, the University has 16 research centers and institutes, each with a focused, interdisciplinary theme. These include the College of Engineering's MTU Regional Groundwater Education in Michigan ([GEM](#)) Center and the National Center for Clean Industrial and Treatment Technologies ([CenCITT](#)). CenCITT is a multi-university consortium established by the Environmental Protection Agency (EPA) with the University of Wisconsin and the University of Minnesota; MTU is the administrative lead organization for the consortium. For a complete list of these

centers see the [Graduate School Bulletin](#) [1.3B, pp. 9–11].

To support MTU's tradition of excellence in both undergraduate and graduate education and research, 96% of our 349 tenured/tenure-track faculty have terminal degrees in their field. This faculty teaches 80% of our courses. We do not rely heavily on non-tenure-track faculty, adjunct faculty, or graduate students to teach undergraduate students (see [Chapter 6](#) for additional details).

Fall 1996 enrollment was 6,195, including 654 (10.6%) graduate students. Consistent with our mission to serve the State, 74% of MTU students are Michiganders; however, students from 45 states and 64 foreign countries attended MTU last year. Over 64% of our students are enrolled in engineering programs, and 89% in engineering or science. MTU has some of the nation's largest undergraduate enrollments in metallurgical and materials engineering and mechanical engineering. Approximately 75% of our undergraduates receive financial aid, and about 80% of graduate students receive assistantships or fellowships.

Degrees are offered at the associate, baccalaureate, masters, and PhD levels, and students also pursue interdisciplinary, preprofessional, and secondary teacher certification options. In 1996/97 we granted 81 associates degrees, 1,186 baccalaureates, 164 master's and 50 doctorates, and in 1996/97 enrolled graduate students in 20 master's programs and 15 doctoral programs. For additional information, see [Appendix 1: General Institutional Requirements](#), and [Appendix 2: Basic Institutional Data Forms](#).

As outlined in [Appendix 3: Federal Compliance Requirements](#), MTU offers programs that are accredited by the Accreditation Board for Engineering and Technology ([ABET](#)) and the Society of American Foresters ([SAF](#)). The School of Business and Economics is currently in candidacy (third year in a five-year cycle) for accreditation by the American Assembly of Collegiate Schools of Business ([AACSB](#)). MTU has been continuously accredited since 1928 by the North Central Association of Colleges and Schools - Commission on Institutions of Higher Education ([NCA-CIHE](#)).

In the ten years since our last self-study, Michigan Tech has embarked on many initiatives designed to meet the challenge of its vision to be a nationally and internationally recognized leader in undergraduate and graduate education and research in sciences and engineering. In the report which follows, we will explore these initiatives and evaluate MTU's progress toward its strategic goals.

Several initiatives have laid the groundwork for change.

- [Executive Leadership](#) . Since 1991, we have built a new team of leaders:

Dr. Curtis J. Tompkins became the [President](#) in 1991,

- Dr. Dale R. Tahtinen became [Vice President for Governmental Relations and Secretary to the Board of Control](#) in 1991,
- William J. McGarry became [Chief Financial Officer and Treasurer to the Board of Control](#) in 1992,
- Dr. Fredrick J. Dobney became [Executive Vice President and Provost](#) in 1993, and
- Dr. John D. Sellars became [Senior Vice President for Advancement and University Relations](#) in 1996.

The product of multiple national searches, this new leadership arrived with a wealth of experience and accomplishments demonstrated at other institutions of higher education.

- *Shared Governance.* A major goal of University leadership has been to create a system of shared governance, which has been accomplished by restructuring the University Senate to include staff as well as faculty, and by the consistent use of University committees and task forces for advice in decision making.
- *Total Quality Education.* The President established an office of Quality Service Education to spearhead TQE initiatives across campus.
- *Strategic Planning Process.* The Executive Vice President and Provost initiated a University-wide strategic planning process in 1994 to increase involvement in planning at all levels of the University (see [Chapter 2](#) for details).
- *Graduate Program Growth.* We have significantly expanded our focus on research and graduate studies. Since 1988/89, seven new PhD programs and 3 masters degree programs have been established. Enrollment has grown from 465 to 654, an increase of 41%, primarily in PhD programs (see [Chapter 7](#) for details).
- *Undergraduate Student Life.* Since 1987, Student Affairs, Educational Opportunity, Enrollment Management, and many academic departments have significantly expanded services to undergraduate students that support student success both on campus and in pursuing careers (see [Chapters 3–5](#) for details).
- *Faculty.* Consistent with our goal to expand graduate education while maintaining undergraduate teaching excellence, we have aggressively pursued high-quality new

faculty in a favorable academic job market. Forty-three percent of our tenured/tenure track faculty have arrived on campus since 1988, increasing the number of faculty by 26%, from 278 to 349 (see [Chapter 6](#) for details).

- *Information Technology.* Since 1988, we have moved from a centralized system to a distributed computing environment. To enable this move, we have installed a fiber-optic backbone to support data networking, recabled campus buildings, and standardized protocols to allow for easy access to networked resources for the more than 2,500 networked computers across campus (see [Chapter 10](#) and the [Information Technology Self-Study \[2.6H9\]](#) for details).
- *Facilities.* New facilities and renewals are improving the quality and quantity of space available for teaching, research, and student life. The \$47 million Minerals and Materials Engineering Building was completed in 1991, the \$7.5 million remodeling of the Memorial Union Building (MUB) was completed in 1989, the \$1.5 million Meese Center was completed in 1997, and the \$44 million Dow Environmental Sciences and Engineering Building will be completed in 1998. Planned initiatives include the Performing Arts and Education Center, which will feature a 1,200-seat performing hall and will bring great events to the campus and community, and expansion of the Forestry Building (see [Chapters 11](#) and [12](#) for details).
- *Academic Calendar.* MTU is the only Michigan public university organized on a quarter system (three 10-week quarters plus a 10-week summer quarter held concurrently with two 5-week intensive terms). In May 1997, the faculty voted overwhelmingly to switch to a semester system, and a task force is now developing a formal proposal for consideration by the Board.

New leadership, new processes, and new organizational structures, plus growth in programs and faculty, all set the stage for a \$100 million capital campaign to commence in 2000 in order to move Michigan Tech into the 21st century.




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Last Revised: 12 DECEMBER 1997

<http://www.admin.mtu.edu/admin/nca/report/ch1/ch1p1.htm>

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Response to Concerns of the 1988 NCA Evaluation Team

In 1988, the report prepared by the NCA Evaluation Team which visited on-site listed nine areas of concern, shown in bold print below. We have responded to each of these concerns over the past ten years, as follows:

Concern 1

The Library is not adequate for an expanded graduate/research mission.

The [Library](#) remains a challenge. Despite a 47% increase in annual library expenditures since 1988/89, from \$1,855,000 to \$2,719,000, some dissatisfaction with the library for graduate education and research persists. Thirty-nine percent of graduate students surveyed in 1997 were not satisfied with the library (see [Chapter 7](#)) and nine departments, five of them PhD-granting, cited the research and graduate collections as inadequate [6.2B8]. Although the increase in funding matches the growth in the general fund budget (in 1994, we ranked third among our eight benchmark institutions in the percentage of total expenditures incurred by the library), it is insufficient to keep pace either with the rapidly escalating cost of scientific and technical serials and monographs required for research and graduate education in engineering and the sciences (these serials constitute 92% of the materials budget), or with the growing cost of electronic technologies required for automation and electronic access to materials. In response, the library continues to expand interlibrary loan and document delivery services and to develop electronic formats for access and delivery of library materials. MTU's peer institutions have been experiencing these same challenges with respect to building and maintaining quality research libraries.

Planned responses to library inadequacies include designating a portion of the 2000 capital campaign to library enhancements, and additional space for the library in a new Science and Information Resource Center. When the State authorizes its next capital outlay appropriation, this Center will receive highest priority by the University. See [Chapter 10](#), Goal Committee 6 Report [6.2B8] and the Library Self-Study [2.6F5] for more detailed information on the library.

Concern 2

Protected classes (particularly Native Americans) remain underrepresented in the faculty, administration, and student body.

Since 1988, we have pursued multiple initiatives to improve the representation of women and underrepresented [2] groups on campus (see Chapters 4 and 6 and [6.2B2]). Our greatest success has been the increased representation of women (see Tables 2 and 3). From 1988 to 1996, the number of tenured/tenure-track women faculty grew by 71%, from 35 to 60, which represents an increase from 13% to 17% of the tenurable faculty. The increase was particularly significant in the engineering faculty, where numbers of women faculty grew from 2 in 1988 to 12 in 1996, representing a 7% increase in tenured/tenure-track women engineering faculty. The percentage of women students has increased somewhat from 23% in 1988 to 26% in 1996. In engineering, the percentage of women undergraduates grew from 16% to 20%. While this falls short of recruitment goals set by the MTU Presidential Commission for Women (PCW), we meet or exceed the national percentages of women in engineering.

Since 1988, the percentage of other underrepresented faculty (see Table 2) have grown from 12% to 15% of the tenured/tenure-track faculty. Except for Asian-Americans, candidate pools for underrepresented faculty in science and engineering remain small.

TABLE 2. Tenured/Tenure-Track Faculty—Women and Underrepresented Groups.

Group	1988	1996	% Change
Women	34	60	+76%
Percentage of Total Faculty	12%	17%	
Asian-American	27	44	+63%
African-American	2	4	+100%
Hispanic-American	2	4	+100%
Native-American	1	1	0%
Total	32	53	
Percentage of Total Faculty	12%	15%	+66%

Source: Institutional Analysis (Fall Headcount)

Enrollment of underrepresented students has increased slightly from 3% of total enrollment in 1988 to 4.2% today (see Table 3). Absolute numbers of underrepresented students have increased by 34%, from 197 to 263. In engineering, underrepresented students increased by 20% since 1988, from 129 to 155 students; this increase from 3% to 4% of the engineering student population tracks growth in the student body as a whole. Our success has been greatest with African-American and Native-American students.

TABLE 3. Student Enrollment—Women and Underrepresented Groups.

Group	1988	1996	% Change
Women	1,503	1,665	+11%
Percentage of Total Students	23%	27%	
Asian-American	94	80	-17%
African-American	36	89	+147%
Hispanic-American	35	48	+37%
Native-American	32	46	+44%
Total	197	263	
Percentage of Total Students	3%	4.2%	+34%

Source: Institutional Analysis (Fall Count)

Although we have not met our goal of 5.5% enrollment of underrepresented students, it has not been for lack of effort. We support an array of precollege academic programs to attract potential women and underrepresented students. In 1989 we established an Outreach and Multiethnic Program division, in 1993 we hired a full-time admissions counselor dedicated to recruiting in high schools with significant African-American populations, and in 1996 we added a Native American Outreach Coordinator in the Multiethnic Division to reestablish relations with high schools and community colleges with significant Native-American populations. Our location in a remote rural area with a cold physical climate, combined with the lack of a significant population from underrepresented groups in the community or University makes Michigan Tech unattractive for some underrepresented groups. Moreover, our predominant focus on engineering and science may reduce the pool of potential applicants. We must continue intensive recruitment efforts and programs to introduce and prepare underrepresented students for science and technology degrees in order to increase the pool of interested students. In addition, our current strategy to develop a broader range of programs in communications, business, and public policy may improve our ability to recruit underrepresented students.

We have also achieved some increased representation of women and underrepresented groups in the administration (see Table 4).

TABLE 4. Administrators—Women and Underrepresented Groups.

Group	1988		1996	
	#	% of Total	#	% of Total
Women	273	42.4%	358	47.2%
Executive Managerial	3	6.8%	13	25.5%
Professional	46	25.6%	122	40.1%
Technical	14	23.0%	13	22.4%
Clerical	171	83.0%	163	90.6%

Skilled Craft	0	0.0%	0	0.0%
Service Maintenance	39	33.6%	47	37.6%
Underrepresented	15	2.3%	27	3.6%
Executive/Managerial	2	4.5%	5	9.8%
Professional	4	2.2%	13	4.3%
Technical	0	0.0%	2	3.4%
Clerical	8	3.9%	6	3.3%
Skilled Craft	0	0.0%	0	0.0%
Service Maintenance	1	0.9%	1	0.8%

Source: Institutional Analysis (Fall Headcount)



Concern 3

The annual reallocation of three percent of departmental budgets is corrosive to faculty morale.

The 3% reallocation ended in 1987/88. However, budget cuts continued through 1993/94, when the University administration instituted a 1% realignment program in order to provide for systematic reallocation of resources. One percent of every unit's budget was automatically captured by central administration, and the resulting pool of captured funds was reallocated in the strategic planning process (see [Chapter 2](#)). The intent was to provide a mechanism to

- realign resources internally to support new initiatives;
- stimulate reassessment of department and unit priorities and activities; and
- provide financial autonomy and responsibility to the colleges, schools, and administrative units.

While it was anticipated that departments would respond to the realignment initiative by reevaluating the need for positions, in fact a majority of departments chose to reduce their supplies, services, and equipment (SS&E) budgets. Morale problems developed in units where realignment was ineffective. After much consultation and discussion across campus, including an evaluation of the process in the departmental self-studies, the administration decided to put a moratorium on the 1% realignment for 1997/98. In response to the Board's concern that we reallocate resources, we will be implementing a pilot position control program. After July 1, 1997, any vacant positions will revert to the Provost, and be dealt with on a case-by-case basis. To resolve the problem with depleted SS&E budgets, in 1997/98 these budgets will increase by 4% across the board.



Concern 4

Cancellation of faculty seed research and creativity programs is inconsistent with the University mission and negatively impacts faculty recruitment.

Partly in response to an internal report on faculty development [5.2A], the Vice Provost for Research and Dean of the Graduate School reestablished a Faculty Development Grant program (now renamed Faculty Scholarship Grant program) in 1995/96 and has funded it for two years at \$70,000 annually on a competitive basis. The Vice Provost also administers a \$200,000 start-up pool for new faculty, a \$400,000 matching pool for grant cost-share, and the Research Excellence Fund (REF), appropriated annually by the State of Michigan at approximately \$1.3 million since the 1980s. The REF is distributed internally on a competitive basis, but is restricted to certain types of research (see [Chapter 8](#)). Initially a line-item in the State budget with reporting requirements, it was rolled into the general operating budget in 1995/96; however, the administration continues to support the use of REF funds to grow graduate programs and faculty research.

Faculty development funds have continuously been awarded by the Faculty Development Committee, primarily to bring speakers and researchers from other institutions to campus. With the creation of the [Center for Teaching, Learning, and Faculty Development](#) in 1996/97 and the appointment of a new director, these funds will be awarded to encourage professional development and creativity in teaching, as well as personal development.



Concern 5

General Education requirements reflect multiple compromises rather than a University-wide commitment to a well-defined program.

We recognize that general education is a General Institutional Requirements (see [Appendix 1](#)), and it has been a challenge to develop it in the context of a technological university. Our General Education program is relatively young. After six years of planning, we implemented a University-wide General Education program in 1985, established a Committee on General Education to review general education curricula on a continuing basis, and graduated the first students under that program in 1989. In common with most general education programs, MTU's program has 64 credits of courses leading to baccalaureate-level skills and perspectives (see the *Undergraduate Catalog* [1.3A, pp. 177ff.]). It also contains a unique requirement for nine credits of thematic study, designated as a "thematic cluster." Due to the very structured curricula of many engineering majors, students often have little schedule flexibility and few free electives, which impedes completing the thematic cluster. This has created some conflict between the academic desire for integrated courses in general education and the practicalities of

course scheduling, which has not been resolved despite several efforts.

Although the Committee on General Education continuously evaluates proposed changes to thematic clusters, no significant evaluation of the general education program as a whole has occurred since its inception. Moreover, MTU's general education program was not designed with assessment in mind, and program goals were not clearly articulated. In 1996/97, an *ad hoc* committee of faculty and staff restated the philosophy and goals (see [Chapter 3](#)) in terms that will allow assessment of student academic achievement in general education. We have already begun to conduct this assessment as a partial basis for reform.

In addition, over the past eight years, we have explored developing a First Year Program across the curriculum. Most recently, in June 1997, we held an on-campus workshop on the First Year Experience, funded by the Michigan Department of Education. Although these efforts to develop a coherent First Year Program have not yet come to fruition, two initiatives taken in 1997 promise to develop a stronger University-wide commitment to a well-defined program of general education: The appointment of a Vice Provost for Instruction to coordinate and provide oversight on curricular matters, and the appointment of a task force to study the proposed calendar change. This change, if approved, would mandate a complete reevaluation of the curriculum in all programs, and provide a new opportunity for developing a well-defined First Year Program that would redefine the current general education system.



Concern 6

University catalogs do not accurately represent actual curricular content of some programs.

Since 1988, we have improved the way in which we represent course offerings in the catalog by designating the timing and frequency of course offering as either annually, in alternate years, or on demand. In 1995/96, Institutional Analysis conducted an audit of all courses which had not been offered in two years, and requested that departments take action to either remove the offerings or revise them.

The University Catalogs produced from 1988–1995 included information for both undergraduate and graduate students. Since 1995, a separate *Undergraduate Catalog* and [Graduate School Bulletin](#) have been published.



Concern 7

Funding for Graduate Assistantships/Fellowships has not increased to reflect the University's emphasis on graduate

studies and research.

The number of supported graduate students has increased from 403 in 1989 to 488 in 1996. While the total number of supported students has thus increased by 21%, the percentage supported remains about the same at 80%. See [Chapter 7](#) for additional information.



Concern 8

Faculty and students perceive a significant problem in effective communication by the central administration.

When President Tompkins arrived on campus in 1991, he instituted several mechanisms for improved communication, including the Student Advisory Board; a Presidential Cabinet with representatives from faculty, staff, and students; Convocation; and Presidential Commissions for Women and Diversity with faculty, staff, and student representatives. In addition to these formal communication mechanisms, he established a continuing series of well-attended annual breakfasts and luncheons with faculty, staff, and students at the President's residence.

The President also restructured [University administration](#) to facilitate discussion of issues across units and push responsibility down through the system to Deans, Directors, and Department Chairs. The linchpin of restructuring was the new position of [Executive Vice President and Provost](#) (see Figure 2).

FIGURE 2. University Organization Chart.*

Board of Control

President

Vice President for Governmental Relations and Secretary to the Board of Control

Internal Audit

Chief Financial Officer and Treasurer to the Board of Control

Accounting Services
Mail Services
Purchasing

Executive Vice President and Provost

Academic Units

College of Engineering
College of Sciences and Arts

Library
School of Business and Economics
School of Forestry and Wood Products
School of Technology

Administrative Units

Athletics
Budget, Planning, and Faculty Personnel
Enrollment Management
Facilities Management
Human Resources
Institutional Analysis
Residential Services
Retail Operations
University Cultural Enrichment

Vice Provosts

Dean for Student Affairs
Information Technology
Instruction
Research and Dean of the Graduate School

Senior Vice President for Advancement and University Relations

Alumni Association
Corporate and Foundation Relations
Marketing Research
Michigan Tech Fund
University Relations

Affirmative Action Officer

* This figure includes full titles; hereafter, titles will be abbreviated.

The Provost communicates regularly with the campus community by meeting at least monthly with the “MOB” groups (academic deans and administrative directors) and the new Academic Forum (academic deans and department chairs); annually with all departments on campus; and monthly with officers of the University Senate and Undergraduate Student Government. He has also invited Graduate Student Council officers to meet with him on a regular basis.

Shared governance has also been a vehicle for communication (see Chapters [2](#) and [6](#)). The Faculty Senate became the University Senate in 1995 with an expanded representation of professional staff. Senate and University task forces and committees have become a regular mechanism to address significant issues such as writing a new faculty handbook; enhancing the Center for Teaching Excellence (now the Center for Teaching, Learning, and Faculty Development); and revising the sabbatical leave and promotion and tenure policies.

As a result of these varied initiatives, both the Report from the 1996 Administrative Evaluation Commission [5.3E], and faculty and staff surveys conducted in 1997 (see Chapters [6](#) and [9](#)), gave central

administration high marks for communication, and reflect the fact that the University community now has ready access to senior administrators.



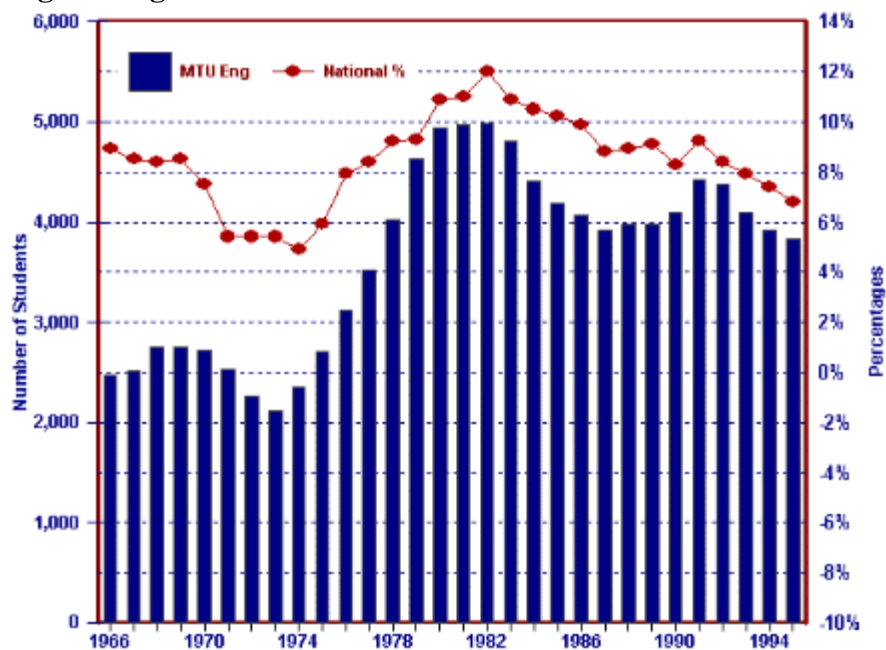
Concern 9

The proliferation of engineering education in Michigan undermines the primary mission of MTU.

The primary mission of MTU is education and research in science and engineering. Since 1988, we have endeavored to broaden our programs to appeal to a wider range of students. New two- and four-year programs in the Schools of Forestry and Technology, new masters programs in social science, and new PhD programs in humanities, computer science, and mathematics all speak to success in this endeavor.

With respect to engineering education, despite competing with 12 engineering programs in the State, we continue to enroll the third largest number of engineering students, after University of Michigan–Ann Arbor and Michigan State University. We also have maintained a stable “market share” of engineering students: Our pattern of enrollment since 1966 closely tracks the pattern of college freshmen entering engineering (see Figure 3).

FIGURE 3. Planned Career Fields of College Freshmen—Engineering: 1966–1995.



Source: The American Freshman: National Norms for Fall 1995 and Institutional Analysis

Nonetheless, we have experienced declining enrollments since 1991, for three reasons. Most significant was the decision to "right-size" Electrical Engineering, raising admission standards to decrease

undergraduate enrollment; the resulting drop in the faculty-undergraduate student ratio provided an opportunity to grow graduate and research programs in the department. A second reason for the recent decline is graduation of a large cohort produced by unusually large new enrollments in 1990–2. A third reason is the declining number of 18-year-olds in the State.

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Self-Study Process

Integration with Strategic Planning Process

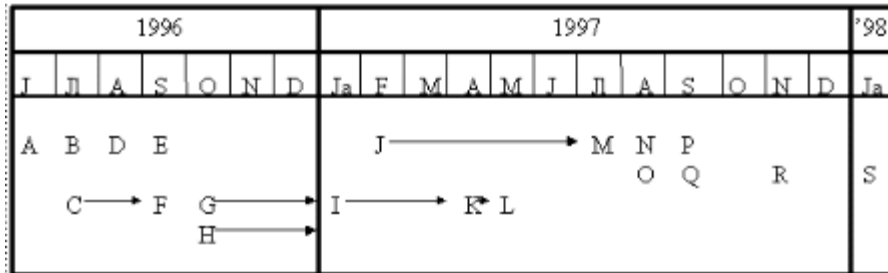
In 1994, Michigan Tech embarked on a new strategic planning process to guide the University in accomplishing its mission and vision. The self-study process for North Central Association (NCA) reaccreditation provided us an opportunity to examine our planning process and evaluate accomplishments toward our strategic goals. The strategic planning process will be discussed in [Chapter 2](#); here, we describe the Self-Study Process and how it was integrated with the strategic planning process in 1996/97.

A Self-Study Coordinator was selected in Winter 1996, and in Spring 1996, a Steering Committee was assembled which included the Coordinator, the Executive Vice President and Provost, the Director of Budget, Planning, and Faculty Personnel, and chairs of ten "Goal Committees" convened to evaluate the University's progress toward its eight strategic goals (three committees were convened for Goal 1 because of its breadth of scope). During the Summer of 1996, the Steering Committee selected a broad and diverse membership of faculty, staff, and students for each Goal Committee (see [Appendix 4](#) for a complete list of committee members) and wrote a detailed charge for each Goal Committee to pursue during the 1996/97 academic year [6.2D].

Because nearly 100 people were directly involved in the Self-Study Committees, the Coordinator established five coordinating mechanisms to keep the process on track:

1. A time-line (see Figure 4) established deadlines for completing the process in a timely manner, and was followed quite successfully.
2. An orientation for all Goal Committee members in September jump-started the process.
3. A Resource Room in the library acted as repository for documents gathered or requested by the committees.
4. Two e-mail lists kept committee members informed about events as the process unfolded.
5. A World Wide Web page (<http://www.admin.mtu.edu/admin/nca/>) provided easy access to basic information about the Self-Study Process, as well as to reports generated by departments and committees during the process.

FIGURE 4. Timeline for Michigan Tech's NCA Self-Study Process.



- A. Appoint Steering Committee.
- B. Submit Self-Study Plan.
- C. Appoint Members to each Goal Committee.
- D. Inventory current institutional data collection.
- E. Present information on Self-Study Process to campus constituencies and Board of Control.
- F. Provide orientation for Goal Committees.
- G. Begin data collection by Goal Committees; complete Jan. 1.
- H. Begin Self-Study by academic and administrative departments; complete Jan. 1.
- I. Begin data analysis and interpretation by Goal Committees; complete rough draft of Goal Committee Reports by April 1.
- J. Begin writing Self-Study Report.
- K. Circulate rough drafts of Goal Committee Reports to Steering Committee.
- L. Complete Goal Committee Reports.
- M. Complete rough draft of Self-Study Report
- N. Circulate rough draft of Self-Study Report within University
- O. Circulate rough draft to Board of Control and other external constituencies
- P. Complete final draft of Self-Study Report
- Q. Complete logistics for NCA Evaluation Team Visit
- R. Send Final Draft of Self-Study to NCA Evaluation Team
- S. Visit by Evaluation Team

Goal Committees worked with Institutional Analysis and the Director of Budget, Planning, and Faculty Personnel to gather necessary documentation. Several Goal Committees conducted surveys of faculty, staff, and students.

Concurrently in Fall 1996, the Steering Committee issued guidelines [6.2D] to all academic and administrative departments for preparing departmental self-study reports. Departments created a committee to prepare their report, which included a departmental mission statement, an evaluation of departmental goals and accomplishments since 1988 as they related to the eight University goals, and, based on this evaluation, a list of strategic initiatives for 1997/98, including those that required new resources. These departmental self-studies became a primary source of information for the Goal Committees; they were available both in the Resource Room and on the WWW to the University community.

The departmental strategic initiatives then entered the University strategic planning process. This linked the Self-Study and strategic planning processes. Engagement in departmental self studies broadened the range of people responsible for planning and heightened awareness of both the Self-Study and strategic planning processes. Units which lacked mission statements developed them, and the administration had a better basis for evaluating strategic initiatives.

The Steering Committee reviewed and provided feedback on all Goal Committee reports in Spring 1997. Complete texts of the Goal Committee Reports are available in the Resource Room [6.2B] and on the [WWW](#). During Summer 1997, the Self-Study Coordinator and a technical editor utilized the Goal Committee reports and Departmental Self-Studies to prepare the University Self-Study.^[3] The Steering Committee reviewed drafts of the University Self-Study in Summer 1997, and approved the final draft in October 1997 for distribution.



Involving External Constituencies

Because the committee structure developed for the self-study process required intensive and frequent meetings, and because our remote location made attendance at such meetings difficult for external constituents such as Board members or alumni, the Steering Committee chose not to add external constituents to Goal Committees. The University's National Advisory Board, the Michigan Tech Fund, and the external advisory boards and academies in the departments, colleges, and schools all provide significant and ongoing insight and feedback into the planning process of these units. Nonetheless, the Steering Committee utilized several strategies to involve external constituencies in the self-study process; it

- encouraged Goal Committees to use alumni and community members as resources;
- presented the self-study process to the Board of Control at its September 1996 and September 1997 Board Meetings and invited Board Members to participate and to follow the process via the [WWW](#) site;
- placed a draft of the University Self-Study on the [WWW](#) site in September 1997 to elicit comments from alumni and the community, in addition to obligatory third-party comment required by NCA;
- provided a draft of the University Self-Study for discussion at the Board's October 1997 retreat; and
- convened a focus group of alumni and community members in Fall 1997 to elicit comments.

The completed University Self-Study Report was mailed to the NCA Evaluation Team in November 1997, before their scheduled visit in

January 1998. It was also placed on our web site.

ENDNOTES

1. Ostrander, C. and Schwartz, J., *Crime at college: The student guide to personal safety*, Ithaca, N.Y.: New Strategist Publications, 1994. [BACK](#)
2. In this Report, we will use the term "underrepresented" to refer to specifically to those ethnic minorities listed in Table 2. [BACK](#)
3. Statistics cited in this Self-Study and statistics in the Goal Committee and College and School reports (see Appendix 6) do not always agree. Because of the lengthy self-study process, new and updated information became available after the Goal Committees, Colleges, and Schools completed their reports. Statistics cited here are accurate and have been verified by appropriate personnel. [BACK](#)

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Mission and Vision

University Mission

The institution established in the Upper Peninsula known as the Michigan College of Mining and Technology, referred to in the constitution of 1963 as the Michigan College of Science and Technology, is continued after January 1, 1964, under the name of Michigan Technological University, and shall be maintained for the purpose and under the regulations contained in this act. The institution shall provide the inhabitants of this state with the means of acquiring a thorough knowledge of the mineral industry in its various phases, and of the application of science to industry, as exemplified by the various engineering courses offered at technological institutions, and shall seek to promote the welfare of the industries of the state, insofar as the funds provided shall permit and the Board of Control shall deem advisable. (From the Constitution of the State of Michigan, 1964)

Michigan Technological University will benefit the State of Michigan and society as a whole through a balance of quality education, theoretical and applied research, and public service. The University will continue to build upon its unique tradition of education in engineering, science, and related disciplines, and to provide the state and its industries with highly qualified graduates. In addition, the University will strive to promote diversity, creativity, leadership, and teamwork, and to educate all of its students to meet the changing needs of a global, technological, diverse, and environmentally sensitive society. The University will seek to enrich and benefit society through its research activities and will assist the community, the state, and the nation in economic and cultural development. (Statement of Interpretation, by the University Direction and Planning Committee,

University Vision

MTU will be a nationally and internationally recognized leader in meeting challenges of the future through excellence in undergraduate and graduate education and research in sciences and engineering. At the undergraduate level, we will have comprehensive, diverse, and relevant curricula that educate technically competent, intellectually vital graduates who are creative, effective leaders and communicators who are aware of the changing social, economic, and cultural values of the world. At the graduate level and in research, we will focus especially on growth in interdisciplinary approaches in areas of established strength and future need. Consistent with the increasing complexity of science and technology, we will substantially increase the proportion of graduate students. At each educational level and within each segment of the University community, we will increase the proportion of individuals from underrepresented racial and gender groups.

Michigan Tech meets Criterion One: We have clear and publicly stated purposes consistent with our mission and appropriate to an institution of higher education. Michigan Tech's purposes, clearly articulated in its vision statement (above) and its strategic goals (discussed below), are consistent with its mission as a technological university that serves the welfare of the State and its industries. The legislated [mission](#), or its 1991 interpretation by the University Direction and Planning Committee, as well as the vision statement and the expectations of President Tompkins, are published in the 1997–99 *Undergraduate Catalog* [1.3A], widely distributed on campus in the annually updated strategic planning document, *1998 and Beyond* [2.1D2], and available on the University Web Page. The strategic goals are also published in *1998 and Beyond*.

The **mission** was first articulated in 1885 in Public Act 70 of the Michigan State Legislature, and restated in the 1964 State of Michigan Constitution. In brief, it charges the University to provide a means for Michigan residents to acquire a thorough knowledge of the mineral industry and the application of science to industry, and to promote the welfare of Michigan industries. With the decline in the mineral industry and the explosive growth of knowledge in science and technology, we now interpret this mission to mean that the University will

benefit the State and society through a balance of education, research, and public service in engineering, science, and related disciplines. By reflecting the growing diversity of our society and the global reach of industry and its impact on the environment, we also interpret our mission as promoting those qualities and activities which enrich and develop society and industry—diversity, creativity, leadership, teamwork, and environmental awareness.

Consistent with this mission, our **vision** is to be a leader in undergraduate and graduate education and research in science and engineering. We envision three ways to accomplish this. First, in undergraduate education, we will offer curricula to educate technically competent leaders and communicators who are aware of changing values. Second, because the increasing complexity of science and technology demands depth and breadth in education, we will expand the role of graduate education at MTU; we will emphasize interdisciplinary approaches appropriate to our strengths and attentive to societal needs. Third, we will promote diversity at home by diversifying the campus community. All three means to accomplishing our vision echo themes in our mission.

The emphasis on science and engineering in the mission and vision explain the predominance of programs in the College of Engineering, the emphasis on science in the College of Sciences and Arts, and the decision to develop Schools of Technology and Forestry (rather than Schools of Education and Law). Our mission to apply science to industry is also reflected in the applied orientation of many curricula in these colleges and schools, and in the programs of the School of Business and Economics. Please see the Undergraduate and Graduate School Catalogs and Appendix 6 for additional information on programs in the colleges and schools.

Michigan Tech's vision is the product of a history of planning initiatives that involve multiple campus constituencies:

- the Long Range Planning (Committee C) Report (1978) [2.1A];
- the 2005 Long Range Plan (1984) [2.1B];
- the University Direction and Planning Committee Report (1991) [2.1C];
- the President Tompkins' Vision Statement and Expectations (1991, revised 1993) [2.1D2]; and
- *1998 and Beyond*, hereafter referred to as the "Strategic Plan" (1995) [2.1D2].

To assure a common and widespread understanding of stated University purposes at all levels of the institution, colleges, schools, and departments have all developed missions consistent with the University mission and vision. The Strategic Planning Process and the Self-Study Process

facilitated the task of mission development at the unit level (see Appendix 6 for College and School missions and visions, and departmental self-studies [2.6], for the specific unit missions and visions).

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Purposes and Planning

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The Strategic Planning Process

In his State of the University Address in 1993, President Tompkins stated that our “planning process should foster educational purposefulness.” Accomplishing our vision requires the articulation of a strategic plan to guide decision making and against which to measure our progress. Long-range planning set targets for accomplishing the vision, but implementation required strategic goals.

A three-year process led in 1994 to the development of a new strategic plan in 1994 (see Figure 5), which had eight strategic goals and related short-term objectives (see Figure 6).

FIGURE 5. Flow Chart of the Strategic-Planning Process.

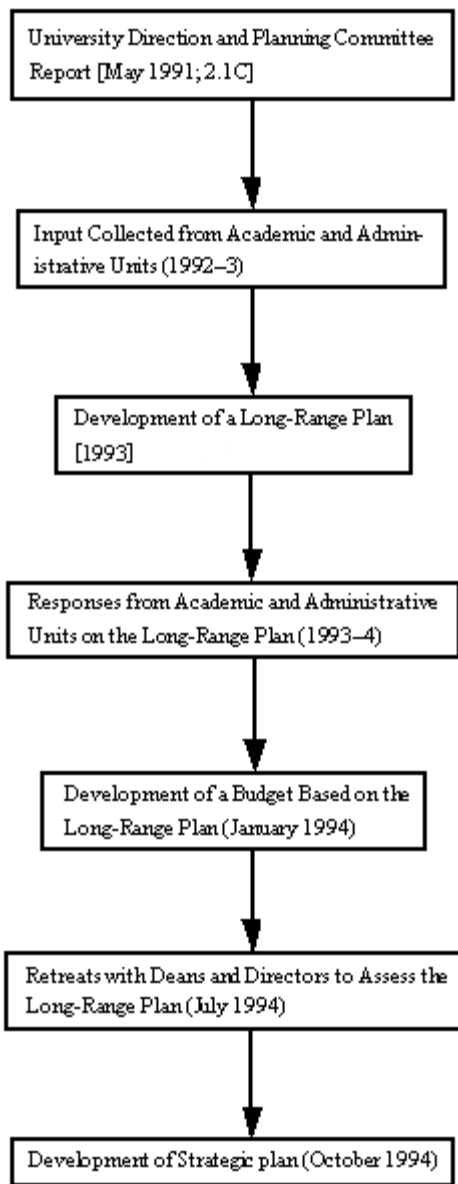
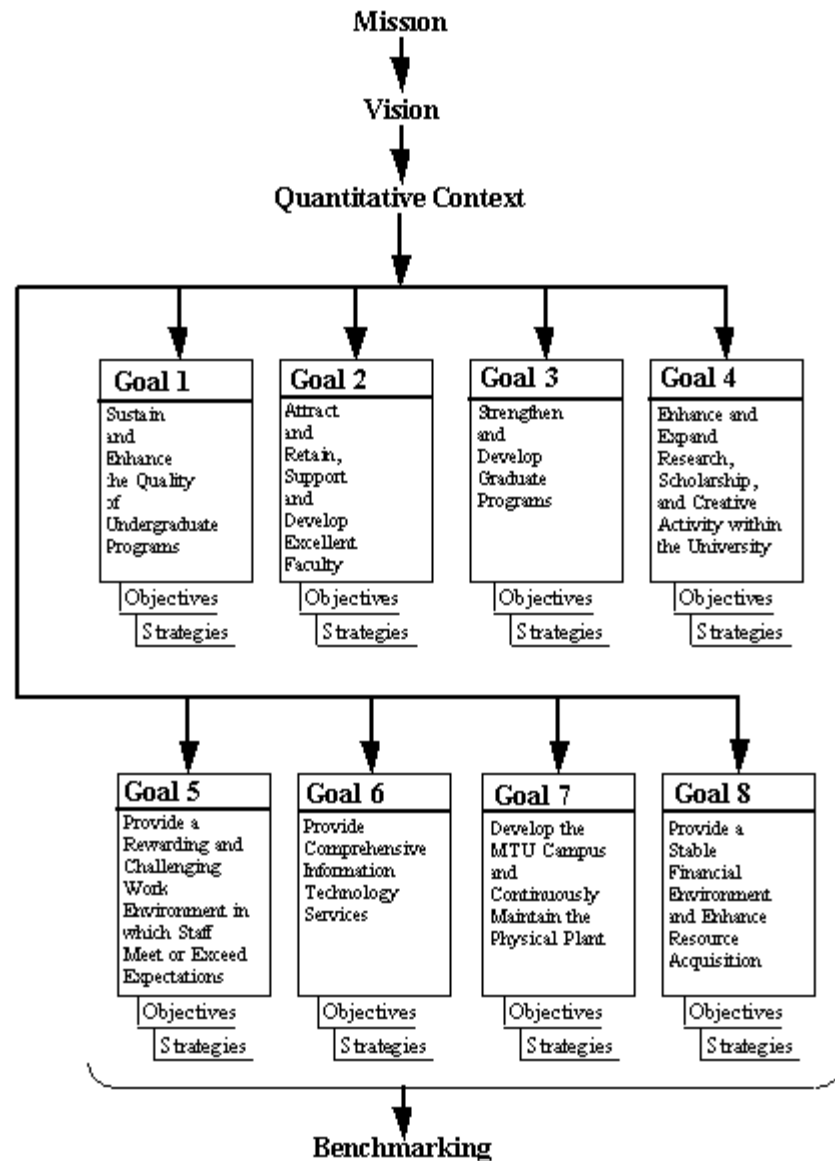


FIGURE 6. Structure of the MTU Strategic Plan.



The President's top three expectations for the University—a student-enriching organization, a model of research and teaching excellence, and a financially strong university—are consistent with Goals 1, 2, 3, 4, and 8. These expectations and goals are all appropriate to an institution of higher education and provide a broad framework within which all units can chart a future which contributes to the whole. Previous planning initiatives targeted specific programs or “spheres of excellence” with which the entire university community could not always identify.

The eight strategic goals create a framework for planning at all levels of the University. The annual strategic planning process, and the budget that results from it, is thus aimed toward contributing to the longer-range goals, objectives, and vision of the University. By pushing the strategic planning process down to the departmental level, the plan provides a process and context for prioritizing budget initiatives, a mechanism for evaluating progress, and a vehicle for enhancing communication within the University community (Concern 8 cited in Chapter 1). The first round of planning under the new set of goals occurred in 1994. In the Fall, the Executive Vice-President and Provost held meetings with academic and administrative units with regard to the new strategic planning process and requested that each unit develop strategic initiatives in support of the

Strategic Plan by December 1994. These strategic initiatives had to represent new or expanded initiatives which would move the University toward achieving its eight goals, be specific enough to be measurable, and be achievable by the unit proposing them. The units' strategic initiatives were assembled, reviewed, and prioritized and became the basis for the development of the 1995/96 budget as well as a five-year budget in January 1995.

The first draft of the budget and the list of funded strategic initiatives were presented to various groups on campus for comment in early 1995: Deans, Directors, and Department Chairs; the University Senate; Staff Council; the Board of Control; and an open meeting called "Tech Tea Time." A final budget was prepared and presented to the Board of Control in May 1995. This process has been repeated annually in 1995/96 and 1996/97. To address some concerns that faculty and staff were not sufficiently involved in the strategic planning process, the Provost and the Director of Budget, Planning & Faculty Personnel began meeting with units in 1995/96 to discuss unit progress against their strategic initiatives and to review the place of these initiatives within the University Strategic Plan and draft budget. In 1996/97, the Self-Study Process for NCA accreditation initiated an in-depth review by each unit (Departmental Self-Study) of its progress toward accomplishing University strategic goals. This process culminated in a review of the appropriateness and adequacy of the eight strategic goals.

In this way, the annual strategic planning process ties decision making at the unit level to the stated purposes of the University. The eight strategic goals also provide the framework for measuring University progress and guiding decision making by the Board of Control with regard to establishing tuition levels and budgets [see, for example, the Annual Progress Reports to the Board of Control, 4.3G and 4.3H].

One method for measuring University progress is benchmarking [<http://www.admin.mtu.edu/admin/prov/bench.htm>]. Benchmarking allows us to assess our performance compared to similar universities, which helps us identify internal strengths and weaknesses and external opportunities and threats. We have chosen benchmark institutions from a range of Carnegie classifications and established benchmark measures for each strategic goal (e.g., student to faculty ratio for Goal 1 and average faculty salaries for Goal 2).

TABLE 5. Benchmark Institutions.

Category	School
<i>Research I Universities</i>	<ul style="list-style-type: none"> • Carnegie Mellon • Georgia Tech
<i>Research II Universities</i>	<ul style="list-style-type: none"> • Lehigh • Rensselaer Polytechnic Institute
<i>Doctoral I Universities</i>	<ul style="list-style-type: none"> • University of Missouri - Rolla
<i>Doctoral II Universities</i>	<ul style="list-style-type: none"> • Clarkson • Colorado School of Mines

- Michigan Technological University

*Masters I
Universities*

- California Polytechnic State
University - San Luis Obispo

Benchmarking provides a vehicle for accountability to the Board of Control, accrediting agencies, the State legislature and other external constituencies such as parents, corporations, and alumni. Benchmark information is provided annually in progress reports to the Board of Control and in reports to the State of Michigan Appropriations Subcommittee on Higher Education [4.5].

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Governance

Michigan Tech is governed by a [Board of Control](#) appointed by the Governor of the State of Michigan (see [Appendix 1: GIR 5–8](#)). The University's Vice President for Governmental Relations serves as Secretary to the Board, and the University's Chief Financial Officer serves as Treasurer. Current board members include:

James A. Mitchell, Chair;
 Martin G. Lagina, Vice Chair;
 Alton R. Berquist;
 James B. Henderson;
 Ruth A. Reck;
 Kenneth E. Rowe;
 Robert M. Thompson;
 Curtis J. Tompkins (ex-officio); and
 Claude A. Verbal.

The Board has enacted bylaws and establishes policy for the University. The board policy on academic freedom published in the *Tenured/Tenure-Track Faculty Handbook* (hereafter referred to as the *Faculty Handbook*) [1.2A, p. 1–21] establishes freedom of inquiry: "Both students and faculty are free to pursue scholarship in an open and creative environment."

The President of the University is selected by the Board of Control. The President has chosen to implement shared governance, which is defined in the *Faculty Handbook* [1.2A, Section 1.4] and on the [Administration web page](#) as "the faculty, staff, and the administration participating cooperatively in developing policies for governance of the University." Effective governance is considered a product of trust and shared responsibility. Shared governance is also stated as an objective in the strategic plan: Involve the faculty fully in the governance of the University (subgoal 4.2.2).

The primary internal mechanisms for shared governance include the [University Senate](#), Staff Council, Undergraduate Student Government, Graduate Student Council, and University, college, school, and departmental committees. The University Senate [3.3] consists of 40 senators elected from faculty and professional staff. After a two-year trial period under a new constitution which broadened participation by professional staff in the Senate, the 1995

Senate constituents voted in Spring 1997 to affirm the new constitution and it was approved by the Board of Control in June 1997. This constitution clarified and expanded the role of faculty and professional staff in governance of the University. The level of involvement of the University Senate in shared governance activities increased under the new Senate constitution. The Senate continued to approve new academic programs and revise instructional policies, but also became more active in other areas such as academic policy, administrative structure, and University finance. Since 1992, some accomplishments which exemplify shared governance and agreement between the Senate and University administration include:

- implementing departmental charters and changing the system of governance at the department level from Department Heads to Department Chairs;
- establishing search, evaluation, and reappointment procedures for Department Chairs, Deans, and University Administrators;
- establishing Scientific Misconduct Policy and Procedures, Conflict of Interest Policy and Procedures, and Faculty Grievance Policy and Procedures;
- establishing and implementing an Administrative Evaluation Procedure;
- establishing the Center for Teaching, Learning, and Faculty Development and the Department of Education; and
- developing an Academic Integrity Policy for faculty and students [1.5C5].

Shared governance also makes use of University committees and task forces for advice in decision making. These task forces and committees have become a regular mechanism to address significant issues such as writing a new faculty handbook and revising the sabbatical leave and promotion and tenure policies.

Additionally, the University has extended the concept of shared governance to include external constituencies in identifying issues of importance to the University, especially opportunities and threats. Mechanisms for involving external constituencies include the National Advisory Board, the Alumni Board, the Michigan Tech Fund Board, and industrial advisory boards at the department, school, and college levels.

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Undergraduate Education

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University Goal 1: Sustain and Enhance the Quality of Undergraduate Education

Subgoal 1: Continuous Improvement of Undergraduate Education

The Goal 1.1 Committee investigated the ways in which the University is continuously improving undergraduate education, and evaluated the University's progress toward meeting its objectives for undergraduate education and assessing student academic achievement. This chapter draws primarily on the Goal 1.1 Committee Report [6.2B1], as well as the Goal 1.3 Committee Report [6.2B3], the college and school self-studies ([see Appendix 6](#)), the Center for Teaching, Learning, and Faculty Development Self-Study [2.6F1], and the Enrollment Management/Registrar Self-Study [2.6H6]. Please see these reports for additional information.

Patterns of Evidence

Purposes



At the undergraduate level, we will have comprehensive, diverse, and relevant curricula that educate technically competent, intellectually vital graduates who are creative, effective leaders and communicators who are aware of the changing social, economic, and cultural values of the world. (University Vision Statement).

Michigan Tech clearly defines its mission as quality education in engineering, science, and related fields, and more specifically describes the process and product of undergraduate education in its vision statement. Neither a narrowly defined technical training institute, nor a comprehensive university that provides education for all possible interests, Michigan Tech offers [30 discipline-oriented baccalaureate degrees](#) in engineering, science, and

related fields, which are described in the *Undergraduate Catalog* [1.3A7]. This is more focused than Michigan's other fifteen public universities, which offer 40 to 216 different baccalaureate degrees. In addition to disciplines traditionally associated with a technological university, such as engineering and mathematics, Michigan Tech offers degree programs in innovative applications of technology, such as [Scientific and Technical Communication](#) (Humanities) and [Applied Ecology and Environmental Sciences](#) (School of Forestry and Wood Products).

Undergraduate education at Michigan Tech has two components: General Education and a major course of study. The purposes of the General Education program as well as the purposes of each major are described in the *Undergraduate Catalog* [1.3A], which is published biannually. Focused course work in the major, designed for the acquisition of disciplinary knowledge and skills, is balanced by course work in General Education which provides broad knowledge of the social, cultural, environmental, and economic contexts of science and engineering. Both components foster personal and professional growth and skill development. Competence in computers, problem solving, critical thinking, and communication are clearly stated objectives under Goal 1.1 in the Strategic Plan.

The importance of acquiring broad knowledge and skills is clearly stated in the University mission and vision, and also in the President's welcoming message in the [Student Handbook](#) [1.2C], which is received by every student. It is consistent with the vision of business and government leaders, who emphasize the national need for broadly educated engineers and scientists with communication and interpersonal skills, and with the tenor of recent policy discussions by the American Association of Colleges and Universities, the American Association for Higher Education, and the American Society for Engineering Education. This affirms that our mission and vision for undergraduate education is appropriate to an institution of higher education.



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Resources

Michigan Tech's human, financial, and physical resources are effectively organized to deliver undergraduate education.

Administrative Structure



Responsibility for undergraduate programs rests with the Executive Vice President and Provost, to whom the Deans of the Colleges and Schools and a new Vice Provost for Instruction report (see [Appendix 8](#) for complete organization charts). In addition, the Committee on General Education oversees the General Education program, and the Director of the Center for Teaching, Learning, and Faculty Development reports to the Vice Provost for Instruction.

Since 1988, three changes in departmental structure have been made to improve the delivery of undergraduate education.

1. [Chemistry](#) moved from the College of Engineering to the College of Sciences and Arts. This should foster shared interests in teaching and scholarship.
2. A new Department of [Fine Arts](#) split off from the Department of Humanities to allow Fine Arts to focus on non-degree activities and classes which offer students opportunities to participate in visual arts, music, and theater.
3. A new Department of [Education](#) was established to support the growing number of students who are seeking teacher certification in science and mathematics. Teacher certification was previously the responsibility of staff in the Office of Teacher Education and Development.

Since 1996, each academic department operates within a Departmental Charter [3.4], which sets guidelines for teaching loads, curriculum review, and faculty reward structures for teaching and scholarship. Undergraduate teaching is a fundamental purpose for most departments, which is reflected in departmental and University reward structures [1.2A; section 2, University Tenure, Promotion, and Reappointment Policy]. Evidence of the increasing valuation of teaching in tenure and promotion include two

promotions to Professor in 1995/96 based exclusively on quality teaching, and the denial of tenure based on inadequate teaching. There is a general consensus that rewards for good teaching need to be more conspicuous, more abundant, and based on a more credible system for evaluation. For more specific information on faculty and their teaching role, see [Chapter 6](#).

This administrative structure has been effective in overseeing strong disciplinary curricula. However, efforts to improve General Education (see below, and [Chapter 1, Response to Concern 5](#)), and to establish interdisciplinary undergraduate programs and courses, have sometimes floundered, despite faculty interest. A vigorously defended tradition of disciplinary independence that sometimes precludes consideration of the broad needs of the University and students as a whole accounts for some of this failure. Moreover, the broad span of responsibilities of the Executive Vice President and Provost made it difficult to provide concentrated attention on undergraduate programs. Although Michigan Tech has long had an academic officer responsible for graduate programs, no comparable position existed for undergraduate programs. Another problem was that the Center for Teaching Excellence, established in 1985, attended primarily to training teaching assistants and processing teaching evaluations. In response to these problems, a new position, the Vice Provost for Instruction, was created and filled in 1997 to focus attention on undergraduate education. The Vice Provost reports to the Provost; his responsibilities will include program review, General Education, faculty development, and student outcomes assessment. The Director of the new Center for Teaching, Learning, and Faculty Development now reports to this Vice Provost.

Michigan Tech operates on the early term system [academic calendar](#). Three ten-week periods of instruction are each followed by an examination week. We are the only Michigan public university not on the semester system, which it makes it difficult to accommodate transfer students and arrange cooperative internships (see [Chapters 4 and 5](#)). Winter term is interrupted twice, by a two-week holiday break and the three days of Winter Carnival; these interruptions reduce its educational effectiveness. Many faculty and administrators are dissatisfied with this system, but students favor it. In 1995, the Retention Task Force recommended a change to a semester system [5.4A], and in 1997 the faculty voted in favor of this change. A task force formed in September of 1997 to study the proposed conversion to semesters has developed recommendations for a semester calendar and is soliciting comments from multiple universities constituents.

Financial Resources



University expenditures for instruction represent primarily

expenditures on undergraduate instruction. Since 1988, expenditures for instruction have grown by 69%, from \$24.5 million to \$41.5 million in 1996. Instruction now accounts for 39.6% of total current fund expenditures (see Table 6).

TABLE 6. Current Fund Instructional Expenditures.

Year	Amount	% of Total Current Fund Expenditures
1987/88	\$24,476	38.32%
1988/89	\$23,559	37.09%
1989/90	\$26,398	36.70%
1990/91	\$30,196	37.12%
1991/92	\$29,625	35.98%
1992/93	\$31,535	36.68%
1993/94	\$36,306	38.62%
1994/95	\$39,323	38.84%
1995/96	\$41,479	39.57%

Source: IPEDS Finance Surveys (Dollars in Thousands)

From 1988 to 1992, total expenditures for instruction grew in dollars, but declined as a percentage of total University current fund expenditures to a low of 36% in 1991/92. Budget cuts had taken their toll on academic programs. In 1993/94, the administration instituted a 1% realignment program to reallocate University expenditures (see [Chapter 1, Response to Concern 3](#)), and departments competed for new funds in the strategic planning process (see [Chapter 2](#)). Instruction benefited from this realignment by capturing a majority of the funding. The greatest impact was on expenditures for instructional technology and new faculty (see [Chapter 6](#)).

Two additional, related measures of instruction include

1. instructional expenditures per fiscal year equivalent student (FYES), and
2. student-to-faculty ratio, measured by FYES/Full-time equivalent faculty (FTEF).

At \$5,800/FYES in 1994, we ranked low compared to benchmark institutions, which ranged from \$4,800 to \$14,400/FYES. At 16:1, our student/faculty ratio was one of the highest among our benchmark institutions, which ranged from 9:1 to 19:1. Since 1994, we have hired many new faculty and enrollment has declined, which should improve the student/faculty ratio. This level of expenditure has allowed us to meet our goal of providing excellent education at reasonable costs, and thereby keep tuition affordable. Because our program quality is high (see ["Accomplishments"](#)) this efficient use of instructional resources has earned us a "best buy" reputation from *Money*

Magazine and U.S. News & World Report.

Financial resources for learning centers and teaching laboratories, including computer labs (see [Chapter 10, "Computing—Financial Resources"](#) and [Chapter 11, "Academic Facilities"](#)) are now managed by departments. Laboratory fees paid by students are credited directly to departments that teach the laboratory courses, and can be adjusted to recover expenditures and plan for replacing or upgrading equipment.

Physical Resources



Departmental self-studies report adequate to excellent facilities. For a complete discussion of instructional facilities, see [Chapter 11, "Academic Facilities"](#). Lecture halls and most classrooms are University-wide resources, although departments customarily have priority for scheduling certain rooms. Most academic departments have their own laboratories, student advising space, small group-meeting and conference rooms, and associated departmental support facilities such as Learning Centers which they are responsible for equipping and operating.



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Self-Study Report

◀ **3** ▶

Undergraduate Education

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University Goal 1: Sustain and Enhance the Quality of Undergraduate Education

Subgoal 1: Continuous Improvement of Undergraduate Education

Patterns of Evidence

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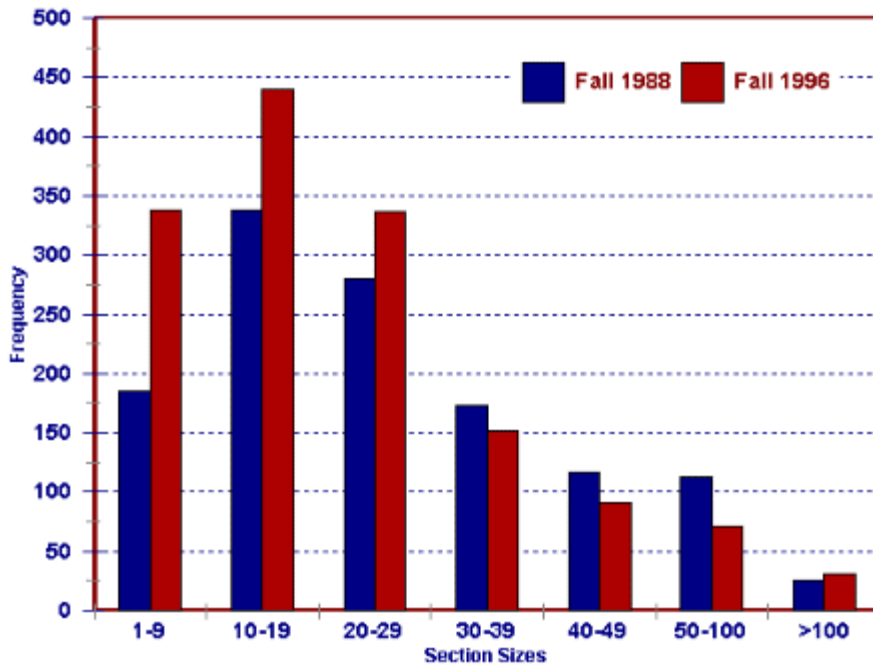
[SWOT Analysis](#)

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Accomplishments

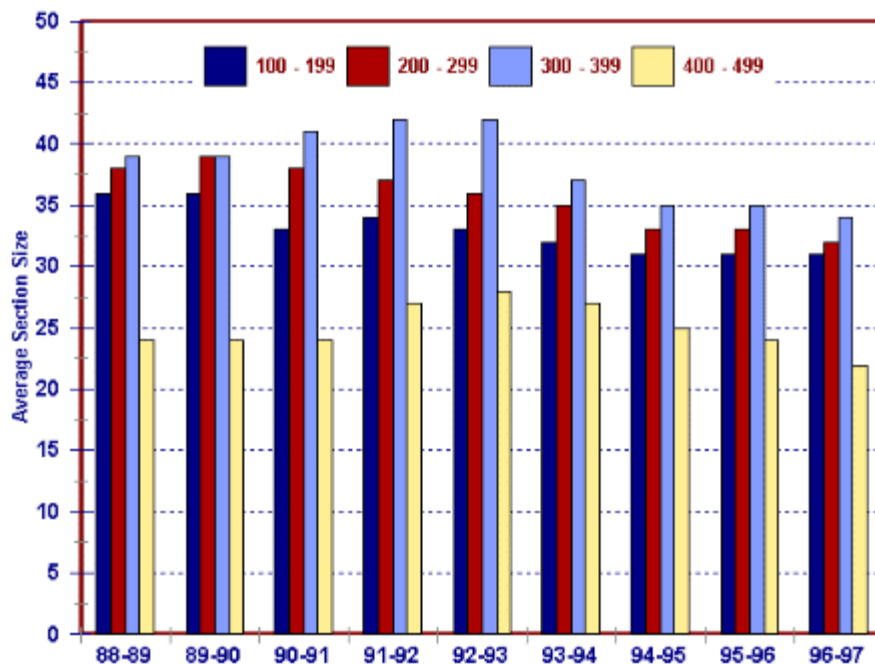
At Michigan Tech, as at many institutions, curricula, instructional goals, and instructional methods are changing. Departmental self-studies [2.6] reveal that many departments have improved their curricula, and added critical thinking, integration of knowledge across classes, and written and oral communication to their lists of goals. One way Michigan Tech has tried to improve student learning is to reduce class or section sizes, initially in first- and second-year courses, then in senior capstone courses. This has generally succeeded; compared to 1988, we now have both smaller and more sections serving somewhat fewer students (see Figures 7 and 8).

FIGURE 7. Frequency of Section Sizes in Undergraduate Classes.



Source: Institutional Analysis

FIGURE 8. Section Sizes by Level in Undergraduate Classes.



Source: Institutional Analysis

However, class sizes in some departments still exceed departmentally determined optimum size.

Cooperative learning, team-based learning, computer-assisted instruction, multimedia instruction, WWW pages, and e-mail are changing the nature of the classroom. Class notes provided by faculty on their WWW pages free students to think more in class. E-mail facilitates rapid communication. Instructors have found that students who are hesitant to ask questions in class may be willing to do so on e-mail. Faculty are also more sensitive to assessment, and many use informal weekly and mid-term assessments to adjust teaching styles and content.

Of course, not all Michigan Tech faculty take advantage of new opportunities for diverse approaches to instruction that might improve student learning. One of the goals of the new Center for Teaching, Learning, and Faculty Development is to help faculty learn and become adept users of new teaching methods and tools (see ["Continuous Improvement"](#)) so we can meet our ambitious goals.

Accomplishments in undergraduate education can be measured by both inputs and outputs. Curriculum, academic support, and administrative support initiatives and programs constitute inputs, and assessment of student achievement, retention, graduation, and placement constitute outputs. Both show Michigan Tech's students are achieving the purposes of their undergraduate education.

Curriculum Review and Revision



As documented in the *Undergraduate Catalog*[1.3A], Michigan Tech's Colleges and Schools offer comprehensive, diverse, coherent, and relevant undergraduate curricula, which enable students to

master a rigorous body of knowledge as well as the intellectual and communication skills they need to become leaders in a complex and changing world. Continuing accreditation by specialized accrediting agencies, including [ABET](#) and [SAE](#), provides assurance that they meet established disciplinary criteria. The University also has an objective in its strategic plan for the development of a formal review process for all undergraduate programs which do not fall within the preview of specialized accrediting agencies.

For a complete list of accredited programs, see [Appendix 3](#). In addition, in 1998/99, the [School of Business and Economics](#) enters its third year of candidacy for accreditation of its BS in Business Administration by the [AACSB](#).

A comprehensive internal program evaluation was conducted by all academic departments in 1996/97, and results are reported in their departmental self-studies [2.6]. A summary review of undergraduate program accomplishments is provided in Appendix 6, Goal 1.1 and in the Goal 1.1 Committee Report [6.2B1].

Since 1988, significant revisions and innovation in undergraduate curricula have improved the quality of our programs. Departments have developed orientation courses to help students plan their careers as scholars and professionals and capstone courses to integrate and assess accumulated disciplinary knowledge. Many courses in the major now explicitly emphasize communications, critical thinking, problem assessment techniques, teamwork, and/or interdisciplinary perspectives. New efforts are being made to include undergraduates in research, a University objective under Goal 1.1. Student computing laboratories and multimedia classrooms are providing opportunities for computer-enhanced instruction. Finally, new degree options have been added to respond to student interests and career opportunities. Given the considerable demand for new resources that accompanies new programs, we have been careful to develop those which meet our mission and clearly identified needs and which can be efficiently supported within the context of existing programs. Examples of these accomplishments include:

- major curriculum revisions in Electrical Engineering, Environmental Engineering, Metallurgical and Materials Engineering, Geological Engineering and Sciences (in process), Mechanical Engineering/Engineering Mechanics (in process) and Biological Sciences;
- new engineering courses in Creative Problem Solving, 3-D Visualization, and Engineering for the Environment;
- new or improved first year programs in Chemistry and Mathematical Sciences;
- a senior Honors Program in Biological Sciences that is centered on undergraduate involvement in research;
- review of 18 disciplines in Humanities, that resulted in

changes, additions, or deletions of 57 courses;

- five new cross-disciplinary courses, consolidation of lower-division courses, and enhancement of upper-division courses in Social Sciences;
- a total redesign of School of Business and Economics undergraduate curriculum to link technology and business functions and enter candidacy for AACSB accreditation;
- a new three term capstone sequence in 1993 and a new baccalaureate degree in Applied Ecology in 1997 in the School of Forestry and Wood Products; and
- a new BS degree in Engineering Technology in 1994 and an Associate Degree in Chemical Engineering Technology in 1997 in the School of Technology.

Michigan Tech's General Education program, established in 1985 and monitored by the Committee on General Education, was discussed in Chapter 1, Response to Concern 5. A more detailed history and evaluation are available in the General Education Self-Study [2.6I1] and a special report prepared by the Goal 1.1 Committee [6.2B1]. The General Education program comprises 64 of the approximately 192 credits required for graduation; these are outlined in the *Undergraduate Catalog* [1.3A, p. 189ff]. Accomplishments since 1988 include the development of five new thematic clusters — social and technological change, psychology, international business, Japanese studies, and organizational behavior — sets of upper-division courses which integrate in-depth learning across the curriculum. General Education will be discussed below in "Continuous Improvement."

[Academic Advising](#)



Because academic advising is a critical academic support system for students, we will discuss it separately here. Each academic department is responsible for its own system of advising, and faculty involvement varies by department. While a few units—Civil and Environmental Engineering, Mechanical Engineering/Engineering Mechanics, School of Business and Economics—have a full-time professional staff advisor position, most have faculty advisors and some use alumni and corporate role models to support advising. The TQE Advising Improves Retention Team found that staff advisors often refer students to individual faculty members for advice about careers or graduate school and that students seek advice on their own from faculty members. Student Affairs supports academic advisors with frequent workshops and an *Academic Advising Handbook* [1.5A1], which has been revised twice in the last three years.

In 1995, the ACT Student Opinion Survey (n = 587 students) reported increased use of academic advising services since 1988 and satisfaction with them [5.4A]. In the 1997 Quality of Student Life Survey conducted by the Goal 1.3 Committee [6.2B3], students rated

advisor's knowledge as good (3.3 out of 4.0), yet rated time spent with and support services offered by their advisor as only adequate (2.7 and 2.8). Nonetheless, the Goal 1.1 Committee Report [6.2B1], Goal 1.3 Committee Report [6.2B3], and Enrollment Management/Registrar Self-Study [2.6H6] registered some dissatisfaction about academic advising and criticized the variability across departments. Students now schedule independently of advisors, and some are concerned that freshmen and sophomores need more advising; however, the fixed requirements for many majors means little flexibility in course scheduling. The Goal 1.3 Committee Survey [6.2B3] revealed that only 17% of the students surveyed tended to turn to a faculty member as their primary source of advice about academic issues. Faculty uncertainty about such fundamental matters as course requirements and scheduling often leads students to rely on peer advice—which, while not bad, is not adequate. The Retention Task Force and the TQE Advising Team recommended that advising become a centralized function at the college or university level, at least for first-year students. Neither group used benchmarking, however, and no action has been taken. The establishment of an Advising Center for first-year students is under discussion.

A systematic review and evaluation of student advising, which compares best practices at benchmark institutions and develops specific plans for improvement, needs to be conducted. While a few departments list effective academic advising as a goal (Mechanical Engineering/Engineering Mechanics, Mining Engineering, Biological Sciences, School of Business and Economics), none of the departmental self-studies address the effectiveness of their current academic advising structure, and only the School of Forestry and Wood Products noted advising as a factor in merit pay.

Academic Support



The Library, Information Technology, and Educational Opportunity are academic support units which are discussed fully in Chapters 4 and 10. Here we will address additional academic support initiatives.

Since 1988, student success in the curricula has benefited from a growing and diverse set of programs and initiatives for both students and faculty which take advantage of new understandings of how students learn. Those which have had significant positive impact on student success are:

- ***Learning Centers.*** Modeled on our long-standing Writing Center (Humanities), Michigan Tech faculty have developed Learning Centers in Mathematics (1989), Chemistry (1989), Physics (1990), Mechanical Engineering/Engineering Mechanics (1990), Computer Science (1995), Biological Sciences (1995), and Electrical Engineering (1996). They offer weekly appointments, walk-in hours, and team learning. Based on Vygotsky's theory that human relationships are important in the learning process, our learning centers provide social and interactive support for learning and include students from

underrepresented groups on their staff to create inclusive environments. The Centers are a primary source of support for students with learning disabilities. A survey of graduating seniors showed usage has grown from 19.5% of enrolled students in 1988 to 60.7% in 1995. Evidence suggests usage positively impacts retention. In the ACT Student Satisfaction Survey, Michigan Tech students gave the Centers the second highest rating of the 23 items listed, second only to recreation and intramural services. The Senior Class of 1996 named the Centers as the beneficiaries of their class gift. It should also be noted that although all departments do not have formal Learning Centers, most have tutoring assistance provided by senior students.

- ***Computing Technology.*** All Michigan Tech students are assured ready access to word processing, spreadsheets, printing, e-mail, and the Internet. Many departments provide and make extensive use of specialized software for mathematics and statistics, geographic information systems, image analysis, graphics, multimedia, and engineering. Staffed computer labs now provide one computer for every 10 students and they have convenient access. Nonetheless, the overall support system for classroom instructional technology needs improvement. Plans for improvement are in place.
- ***Undergraduate Research.*** Michigan Tech is now an Institutional Member of the Council on Undergraduate Research. Faculty in Mathematical Sciences, Electrical Engineering, and Civil and Environmental Engineering have won National Science Foundation (NSF) Research Experience for Undergraduates grants to support student summer research, and Biological Sciences established a senior Honors Program in 1993 that is centered around a year-long research experience. Since 1993 over 30 students from underrepresented groups have participated in undergraduate research through various Michigan Space Grant Consortium and Michigan Office of Equity grants. Since 1988, the Century II Endowment Equipment Fund provided \$110,165 in grants to faculty and departments for the purchase of equipment to be used in either classroom instruction or undergraduate research [6.2B1].
- ***Professional Student Organizations and Project Teams.*** Nineteen professionally oriented student clubs, chapters and honor societies (e.g., American Society of Civil Engineers ([ASCE](#)) and [Tau Omega Pi](#) School of Technology Honor Society; see Departmental Self-Studies [2.6]) are supported by University financial resources and investments of faculty time. Guest lecturers, off-campus trips, and service projects sponsored by these clubs significantly enhance student learning. Michigan Tech has also sponsored student teams in 14 regional or national competitions, such as the FutureCar Challenge, the National Plastics Council Plastics Recycling Competition, and ASCE Timber Beam Competition. These

competitions typically involve design, fundraising, fabrication, testing and representing MTU off-campus at the competition site.

- ***The Office of International Programs.*** Established in 1994 with two professional staff, the [Office of International Programs](#) (OIP) facilitates traditional study abroad programs and direct reciprocal exchanges for our students. Recent membership in the National Student Exchange (NSE), the International Student Exchange Program (ISEP), the Council on International Educational Exchange (CIEE) and the Institute for International Education (IIE) has increased our students' participation in international study to 22 students in 1995/96 and 43 in 1996/97. OIP has also been instrumental in enrolling new international students, who enhance cultural diversity within our institution. We enrolled 80 new undergraduate international students in 1996, for a total of 233.
- ***The Center for Teaching, Learning, and Faculty Development (CTLFD).*** Established in 1996 to replace the smaller Center for Teaching Excellence established in 1985, the [CTLFD](#) recruited a full-time Director through a national search and also hired an Assistant Director. Its first task was piloting a new instrument for student evaluation of teaching, the IDEA evaluation tool from Kansas State University, with 58 tenured faculty during Winter term 1996/97. The new instrument was endorsed by the University Senate in 1997. A weakness in the current system of evaluation is a policy that prohibits retention of evaluation data; this impedes the development of programmatic outreach to improve instruction. The CTLFD also took over the administration of Faculty Development Grants to emphasize proposals which relate to teaching and learning, and the Director is working with the Learning Centers to coordinate resources. An advisory board of faculty and staff assists the Director.
- ***Faculty Teaching and Scholarship.*** Michigan Tech faculty are expected to be both teachers and scholars (see [Chapter 6](#) for full discussion of faculty role in teaching). Since 1988, most instructor positions have been converted to tenure-track positions with expectations for scholarship. Sixty-six percent of undergraduate section credit hours are now taught by tenured/tenure-track faculty. Scholarship on teaching and grants for curriculum development are encouraged and rewarded. Since 1992, MTU faculty have received seven grants from NSF for improvement of undergraduate curriculum totaling \$634,261 [6.2B1].
- ***New Faculty Orientation.*** In 1995, Michigan Tech began an expanded orientation for new faculty, which includes a session before classes start in the Fall and a series of teaching seminars during Fall and Winter terms (see [Chapter 6](#) for details).

- **Teaching Assistant Training.** In 1995/96, 17% of credit hours were taught by graduate student teaching assistants (TAs;) (see [Chapter 6](#)). Humanities, Chemistry, Computer Science, and Mechanical Engineering/Engineering Mechanics have formal TA training programs. A typical program has 15 hours of summer preparation and 15 hours of "just-in-time" skill development during Fall term; the programs cover learning styles, cognition theory, human development theory, diversity, and techniques for organization and presentation. The impact of this training is evaluated, and scores on teaching evaluations are consistently higher TAs who underwent training. This is particularly true for new TAs. The CTLFD will assume oversight for new for TA orientation, and each department will be responsible for TA training in Fall 1997.
- **Efficacy Seminars.** Ninety-four full-time faculty attended two- and three-day seminars conducted by The Efficacy Institute, an educational consulting firm in Lexington, Massachusetts. These seminars promoted a *development model* instead of an *innate ability model* of learning, which is particularly conducive to success of students from diverse backgrounds. Funded primarily externally, it appears to be successful.
- **Advisory Boards.** University, college, school, and departmental advisory boards composed of alumni and friends of the University provide valuable support for all units. Established primarily since 1988, they help set priorities for curriculum development, serve as ambassadors to off-campus constituencies, and assist with advancement efforts.

In addition to these academic support initiatives, student achievements are recognized and honored at annual awards banquets, and students are becoming involved in departmental governance by serving on advisory and standing committees. For a discussion of Student Affairs' accomplishments to support student scholarship, see [Chapter 5](#).

Administrative Support



Administrative support for undergraduate education is supplied by the [Registrar](#) [2.6H6.d]. Although the 1993 automation of support systems using the BANNER® system has at times been problematic due to incompatible databases, it has improved students' abilities to schedule courses and plan for graduation. Staff have worked hard to overcome deficiencies in the system. Several accomplishments since 1988 include:

- computerizing and publishing both in print and on the WWW the quarterly scheduling of University classes, including final exam times;
- computerizing the student scheduling and ID card schedule print request system (1993);
- progress toward an automated Degree Audit System;
- facilitating student access to grades by phone;

- making electronic transcripts and free "unofficial" transcripts available to the student body and;
- reducing time that students spend in line registering for classes and paying their bills (a result of the TQE Line Elimination in Student Services Team).

Nonetheless, the BANNER® system is not fully functional, and the time between graduation and distribution of degrees needs to be reduced. Enrollment Management is investigating WWW, telephone, and remote location registration to eliminate lines at registration.

Assessment



[Assessment](#) of student academic success is underway. By Spring 1997, all academic departments completed assessment plans, and our Program for Assessment of Student Academic Success [2.7] completed its first academic cycle in October, 1997. The opening pages of the *1997-99 Undergraduate Catalog* [1.3A] include a discussion of student academic success which clearly identifies the purpose, methods, and desired outcomes of assessment (see "[Continuous Improvement](#)").

Retention, Graduation, and Placement Rates.



Traditional indicators show we are accomplishing at least as much as our peers, with fewer financial resources. In comparisons of colleges and universities as reported in *U.S. News & World Report*, MTU's retention rate for first-year students is 84%, comparable to our benchmark institutions (see [Chapter 4](#) for a full discussion of retention), and our graduation rate after 4 years is 63%, compared to a high of 86% at Lehigh University and a low of 53% at University Missouri-Rolla. Baccalaureate programs in civil, environmental, geological, mechanical, and metallurgical engineering have achieved national recognition, consistently ranking in the top 10 nationwide for degrees awarded.[\[1\]](#)

Although the University has little systematic data, it appears that not only do Michigan Tech students graduate, they also are placed easily into [career positions](#) at competitive salaries. The number of employment interviews per graduate increased from six in 1993/94 to eight in 1995/96. Of those responding (45-75% response rates) to MTU Career Center surveys of recent graduates since 1992, over 90% reported full-time employment or enrollment in graduate school. Salaries offered to Mechanical Engineering/Engineering Mechanics graduates, the most-enrolled major at MTU, averaged \$37,226 (\$23,040-\$48,600) for 1995/96. When asked to rate their MTU education as preparation for their current job, compared to co-workers from other universities, 73% of 457 Mechanical Engineering/Engineering Mechanics graduates surveyed from 1984-1990 (23% response rate) rated it as either much better or slightly better.

Retention, graduation, and placement data suggest that Michigan

Tech is accomplishing its purpose of providing the State and its industries with highly qualified graduates. However, this data does not allow us to assess fully our purposes of providing excellent education and student success in learning.

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Continuous Improvement

We expect that the core strengths that have contributed to Michigan Tech's success in the past—its students, faculty, staff, and physical plant—will continue to be assets in the future. Perhaps the most important criterion for continuous improvement is the spirit of cooperation between faculty, staff, and administration and the belief that we can improve. The Goal 1.1 Committee judged that we have not always had this spirit or belief in the past and attributed this progress to the current central administration's attitude of openness and collegiality, the faculty's sense of optimism and pride in the progress of the University, and the staff's cooperative attitude and willingness to adopt TQE principles.

Innovation and new initiatives are welcome. Many accomplishments discussed earlier were the result of a few faculty or administrators who set out to achieve a vision for improved educational programs. Despite the rapid changes required in education today, resistance to change at Michigan Tech has been relatively low. Fortunately, teaching loads at Michigan Tech still allow most faculty time to consider, plan, and implement improvements to courses and curricula (see [Chapter 6](#)).

In addition, we believe our new program for assessment of student academic success, anticipated reform of General Education and the academic calendar, the improved teaching evaluation system, and new and renovated facilities (for a discussion of facilities, see [Chapter 11](#)) will support continuing improvement. Significantly, these activities take place in a climate of increasing emphasis on quality teaching, learning, and continuous improvement fostered by the central administration.

We take pride in meeting our goal of providing a high-quality undergraduate education at a reasonable cost, which requires us to efficiently administer our resources. As we develop our commitment to critical thinking, integration across disciplines, teamwork, and communication skills, we are learning that teaching in this way involves more student-instructor interaction, and therefore more instructional time per student. Our use of advanced technology in undergraduate education also has a substantial price. Innovations such as the use of undergraduate student assistants has improved student learning while reducing personnel costs. However, as we set more ambitious goals for teaching and learning, we will have to pay more to achieve them. The degree of continued improvement in instruction that can be supported by increased efficiency in non-instructional areas is limited. This is a continuing

problem shared by all universities.

Assessment



Our Program for Assessment of Student Academic Success is central to improving our educational programs. We are assessing three broad areas:

1. disciplinary skills and knowledge of the major,
2. breadth of understanding and skills for life-long learning, and
3. acquisition of values and attitudes consistent with the traditions of scholarship.

Degree granting departments are responsible for planning and implementing assessment of student academic success in their majors. Special committees are responsible for assessing General Education and student development.

Our program was developed in three steps:

1. building a framework for assessment,
2. building unit assessment plans, and
3. implementation.

The framework was built by faculty with support from assessment professionals. Dr. Patricia Murphy (North Dakota State University), an authority in assessment recommended by NCA, critiqued unit assessment plan drafts developed by faculty in June 1996 and came to campus in early November 1996 to conduct assessment workshops and discuss revised plans. Implementation began in November 1996, and the first full cycle was completed in November 1997. The annual assessment cycle will be directly linked to the strategic planning and budgetary decision making process (discussed in Chapter 2), which will enable the University to use assessment findings to make decisions about strategic initiatives proposed by colleges, schools, and academic support units.

A complete discussion of our [Program for Assessment of Student Academic Success](#) and unit plans is available in our Resource Room [2.7]. We expect our assessment program to provide more precise and accurate information on student learning, which will help us evaluate and improve curriculum and teaching practices with greater confidence.

Continuous Improvement of General Education.



In 1988, the NCA Evaluation Team expressed a concern that Michigan Tech's requirements for General Education did not reflect a coherent program, and that no University-wide commitment to a well-defined program existed [6.1A, page 74, item 5]. We have responded to this concern in Chapter 1 (Response to Concern 5).

Although the Committee on General Education continuously

evaluates proposed changes to thematic clusters, no one individual or group has had responsibility for assessing and improving the General Education program. Faculty and academic administrators tend to view general education from their own disciplinary perspectives. This situation will improve under the leadership of the new Vice Provost for Instruction, who has a mandate to reform General Education. Anticipating this mandate, three academic administrators and faculty participated in the American Association of Colleges and Universities (AAC&U) workshop on reform of general education in February, 1997.

When we began building our assessment plan, we discovered that our General Education program was not described in terms that allowed assessment. The description provided in the *1995-97 Undergraduate Catalog* [1.3A] was intended more to inspire the reader than to provide a statement of broad philosophy or specific goals:

The General Education Requirements stated here, when combined with the major support courses and electives, assure that each graduate of the University has made significant progress toward becoming a truly educated person capable of lifelong learning. In particular, the purpose of these requirements is to provide the means by which graduates will have

- a principle-oriented education in the area of specialization;
- the development of the habits, skills, and basic foundations needed for continued education;
- the development of effective written and oral communication skills;
- an exposure to literature, the arts, world cultures and social problems with an historical and contemporary perspective; and
- an appreciation for the methodologies, issues, prospects and the social impact of the sciences and technology.

An *ad hoc* committee of faculty and academic staff working during the Winter term of 1996/97 drafted a new statement of philosophy and goals for general education:

Philosophy

The MTU General Education Program is designed to provide graduates with the skills, knowledge, and intellectual habits necessary to support their personal, professional, and public lives as university-educated persons and to provide for their continuing growth and development.

Goals

Upon successful completion of the General Education

Program, MTU students will have

1. foundational communication and quantitative analytical skills,
2. an understanding of the principles and methodology of scientific inquiry,
3. knowledge and appreciation of the human experience from the perspectives of the arts and humanities and social sciences, and
4. the experience of in-depth advanced-level study in an area of interest distinct from their majors requiring the integration of knowledge and perspectives.

These goals are stated in terms that allow us to assess whether or not they are being achieved, and we can map each goal directly to course requirements to show where in the curriculum each goal will be supported. A general education assessment pilot project based on senior essays was implemented in Spring 1997. Additional assessment measures are planned for the future.

Continuous Improvement of the Center for Teaching, Learning, and Faculty Development.



Developing and implementing a comprehensive faculty evaluation system that encourages the growth and development of faculty and thereby supports student learning is a long-term project that requires faculty collaboration. The generally low regard for the current system for student evaluation of teaching prompted the piloting of the IDEA instrument by the new [CTLFD](#) and led to its approval by the University Senate in Spring 1997. The current system will remain in place for one year for evaluative purposes during the transition period, but all teaching personnel will receive regular, specific, and constructive feedback for developmental purposes on their instructional efforts from this new instrument beginning in Fall 1997. Because the CTLFD will begin to access evaluation data, it will be able to foster a climate where improvement and refinement in teaching are encouraged and supported.

Improved evaluation of teaching will make our annual Distinguished Teaching Awards more meaningful. Finalists are now selected by ballots cast by a small percentage of the student body. The IDEA instrument will allow us more accurately to identify Michigan Tech's best teachers.

Other CTLFD resources or activities which will improve undergraduate instruction include [2.6F1]

- a pedagogical resource center for faculty and TAs,
- a WWW page devoted to instructional improvement,
- student academic achievement assessment tools and feedback processes,
- Faculty Development Grants focussed on teaching and learning,

- a needs assessment and the coordination of Learning Centers,
- the administration of the Upper Midwest Faculty Forum (formerly administered by Educational Opportunity), and
- the coordination of the faculty and TA orientation and weekly teaching seminars.

Integrity



Over the last decade, University processes have become more open and their integrity more widely recognized. Michigan Tech has established policies and practices that clearly define the rights and responsibilities of diverse members of the University community.

[\[2\]](#)

Administrators, faculty, staff, and student leaders have become increasingly active in efforts to make undergraduate students aware of their rights and responsibilities.

Three publications clearly describe student rights and responsibilities:

1. *Undergraduate Catalog* has a section entitled "Academic Standards and Procedures" [1.3A, pp. 10-14].
2. *Student Handbook* [1.2C, pp. 129-153], presented to each student at the beginning of the academic year, describes students' legal rights to access academic records, appeals procedures for a variety of academic issues, and services for students with disabilities. Printed as a spiral-bound volume 5 × 8 inches, the *Handbook* was designed to be a student-friendly resource. Its contents are stressed during new student orientation and in many department orientations.
3. *MTU Student Rights and Responsibilities* [1.5C3], a brochure prepared for distribution to classes and other groups includes a 1995 policy on disruptive or disorderly conduct in the classroom.

Student Affairs enforces student academic standards. In 1995, a new formal procedure to adjudicate student integrity issues was implemented to provide more due process and to guarantee that a disinterested party makes the final judgment about student academic-integrity issues. Individual faculty are no longer expected to decide on issues of student academic integrity on their own. The Student Affairs Self-Study [2.6H11] concluded that this new procedure is providing timely decisions based on clearly articulated standards, and has significantly improved student attitudes toward the process.

Faculty performance in fulfilling their teaching roles and responsibilities is evaluated annually (see [Chapter 6](#)). Department Chairs identify faculty who are not meeting expectations and develop plans for addressing shortcomings. Continuing failure is rare, as are formal student complaints,

which suggest that faculty are doing a good job in their roles as teachers.

Scheduling specific classes, particularly for general education, can be a problem for students whose degree requirements leave them with little flexibility in their schedules. In response, the University has added sections of classes to accommodate student needs. Humanities now guarantees its students timely scheduling of classes needed for degree completion. Scheduling examinations is also sometimes a problem. Although University policy prohibits scheduling final exams during the last week of the term and restricts scheduling evening exams, this sometimes occurs.

The time required to complete a degree concerns many at Michigan Tech. Common wisdom says our engineering majors take on average five years to complete a four-year baccalaureate degree. Data compiled by Institutional Analysis revealed that students enrolling since 1990 with no transfer credit completed baccalaureate degrees in 13.2 terms (College of Sciences and Arts) to 13.4 terms (College of Engineering), only slightly more than four years. Many of these students enrolled for a summer term to retake courses for a better grade. This time-to-degree is comparable with other universities' engineering programs and indicates that public expectation of a four-year degree is being met.

Michigan Technological University transcripts follow the guidelines prepared by the American Association of Collegiate Registrars and Admissions Officers. Our most recent internal audit of the Registrar's procedures states that we are in compliance with applicable MTU policies.

We conclude that Michigan Tech demonstrates a high level of integrity in its assertions about and delivery of undergraduate education. Nonetheless, public expectations for accountability in higher education are increasing. Our Program for Assessment of Student Academic Success will play a pivotal role in meeting these expectations.

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SWOT Analysis

Since 1988, our programs of undergraduate instruction have responded to changing student needs, taken advantage of opportunities provided by evolving technology and pedagogy, and generally grown in diversity and quality. In large part, this responsiveness has been accomplished through the initiative of faculty and encouraged and supported by the administration and staff. As the needs and interests of students continue to change, we must anticipate them and prepare to respond appropriately. Weaknesses in teaching evaluation and reward systems and problems with General Education and interdisciplinary efforts can be traced in part to a strong tradition of disciplinary independence at the expense of centralized instructional policy.

In summary, the strengths, weaknesses, opportunities, and threats (SWOT) with regard to undergraduate education are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Curriculum reform • Learning Centers • Technology-assisted instruction • Improved teaching facilities • Student-friendly catalog • Center for Teaching, Learning, and Faculty Development • Advisory Boards • Student organizations • Faculty and TA training • Improved international programs • Supportive administration • Facilities 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Quarter system • Support system for teaching technology • Lack of interdisciplinarity • Teaching evaluation • Rewards for teaching • Uneven TA training • Large class size in some departments • Lack of consensus about general education's purposes • Uneven

implementation
of assessment
across
departments



Opportunities

- Emphasis by business and industry on fundamental skills: communication, teamwork, etc.
- National focus on undergraduate education
- Increased public expectation for accountability in higher education

Threats

- Weak preparation in math and science in high schools
- Student focus on acquiring credentials, rather than education

External Assessment of the Environment



Action Plan

To take advantage of opportunities and remedy concerns with regard to undergraduate education, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Change the academic calendar to improve student learning.	<ul style="list-style-type: none"> • University task force
2 Begin campus-wide dialogue on the purposes and structure of general education.	<ul style="list-style-type: none"> • Vice Provost for Instruction
3 Improve efficiency, effectiveness, and understanding of Assessment Program.	<ul style="list-style-type: none"> • Vice Provost for Instruction

4	Implement a better system for student evaluation of instruction that supports teaching improvement.	Director, Center for Teaching, Learning, and Faculty Development
5	Recognize and reward effective teaching in salary increments, promotion, and tenure.	<ul style="list-style-type: none"> • Executive Vice President and Provost
6	Inventory campus-wide needs for instructional technologies and develop plan for meeting them.	<ul style="list-style-type: none"> • Vice Provost for Instruction • Information Technology
7	Improve administrative structure to support interdisciplinary teaching and scholarship.	<ul style="list-style-type: none"> • Vice Provost for Instruction
8	Establish an Advising Center for first-year students (under discussion).	<ul style="list-style-type: none"> • Vice Provost for Instruction • Dean of Student Affairs

This action plan will be integrated into the strategic planning process for 1998/99.

ENDNOTES

1. "Engineering and Technology Enrollments, Fall 1996" Engineering Workforce Commission of the American Association of Engineering Societies, Inc. [BACK](#)
2. In this chapter we focus on undergraduate student academic integrity issues. Other undergraduate student rights and responsibilities will be discussed as appropriate in Chapters 4 and 5, and graduate student integrity will be discussed in Chapter 7. Issues related to faculty and staff integrity will be discussed in Chapters 6 and 9. [BACK](#)





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University Goal 1: Sustain and Enhance the Quality of Undergraduate Education

Subgoal 2: Assure the Recruitment and Retention of a High-Quality, Diverse Student Body

The Goal 1.2 Committee evaluated Michigan Tech's recruitment and retention of undergraduate students, including its progress toward meeting strategic objectives. Although a unified statement of purpose addresses both recruitment and retention, patterns of evidence for resources, accomplishments, continuous improvement, integrity, and SWOT analyses and action plans are sufficiently different to warrant separate discussions. This chapter draws on the Goal 1.2 Committee Report [6.2B2], the Enrollment Management Self-Study [2.6H6], the Educational Opportunity Self-Study [2.6F2], and the college and school self-studies (see [Appendix 6](#)). Please see these reports for additional information.

Patterns of Evidence

Purposes



In order to accomplish the University's mission of providing industry with highly qualified graduates, we must attract and then retain students who graduate with appropriate knowledge and skills to obtain jobs. In order to meet our goals for diversity, we must recruit and retain a student body with balanced representation in ethnicity and gender. Enrollment Management's mission to help recruit and retain a diverse student body with high academic qualifications is consistent with the University mission. Given our location and our

engineering and science focus, accomplishing this mission and vision requires continued, focused outreach and recruitment, particularly for women and other underrepresented student groups. Fortunately, the growing importance of technology in today's society, and the increasing numbers of women and high-school graduates from underrepresented groups, provide opportunities for success.

The *Undergraduate Catalog* [1.3A], which is widely distributed to potential students, parents, and school personnel, and the [viewbook](#)—*The TECHnological Advantage* [7.5E], a marketing tool to attract students and encourage them to apply to the University, both emphasize desirable factors which assist in recruitment and retention: academic excellence, a caring environment intent on students' success, successful placement at the end of the college experience, and career-management skills such as teamwork and leadership to help students change with the times as their careers develop. Two Undergraduate Student Government (USG) surveys [6.2B2] conducted in Fall 1996 and Spring 1997 (30% and 15.5% response rates, respectively) identified the two main reasons for choosing Michigan Tech as academic reputation (24%) and future job opportunities (15%).

Since 1993, the *Viewbook* [7.6A2] has emphasized our "good value" (benefits which exceed costs) and placement experience, in order to reflect the increasing importance of educational cost and jobs as factors in parental and student decisions about selecting an undergraduate institution. However, while Michigan Tech is a "good value" for engineering and science education, for other disciplines it is priced at a premium compared to Michigan's regional, comprehensive universities. This may make it more difficult to attract and retain a significant number of students in a greater diversity of disciplines.

Ambitious enrollment goals of 7,100–7,300 students were established in the Strategic Plan [2.1D2, "Quantitative Context for Planning"] which is presented to the Board of Control and other internal constituencies. Also in the Strategic Plan, we set the goal of increasing the numbers of students from underrepresented groups at a steady rate, to more than doubling the numbers enrolled from 1992/93 to 1997/98. Additional enrollment goals for women and students from underrepresented groups were initially established by the 1989 Minority Programs Task Force (MPTF) [5.5A], and revised by the PCW (Presidential Commission for Women) [5.5C] and the 1995 Retention Task Force [5.4A]; these are discussed below. These goals have been widely distributed internally and include recommendations for achieving them. The Retention Task Force also set ambitious 10-year retention goals of 95% retention after the first year, 90% after the

second year, and 85% after four years.

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Recruitment

Resources

The University now has significant processes and services to help meet its recruitment goals. In 1994 we engaged the Noel Levitz Center for Enrollment Management, a national consulting firm, to conduct an analysis of enrollment management operations. When they judged our operations as outmoded, we responded by organizing our resources more effectively, including:

- organizing student recruitment by territory;
- reorganizing Enrollment Management, putting all the functions (admissions, marketing, financial aid) into one unified Enrollment Management department with a coordinated strategy and leadership;
- implementing a student records database (BANNER®) to track students from initial inquiry to graduation, and analyzing this information to increase conversion rates from inquiry to enrollment; and
- implementing the Noel Levitz Enrollment and Revenue Management System (formerly known as the Financial Aid Leverage Analysis System) to help identify the correct balance between financial aid, tuition, and enrollment management policies.

Stabilization and modest turnaround in first year enrollments in 1997 suggest resources to support recruitment are at a level to reach our enrollment goals. However, the activities of Enrollment Management must be effectively coordinated with other University recruitment efforts.

Administrative Structure



Until 1992, all student services, from admissions to international students to counseling, reported to a Vice President for Student Services. Administrative restructuring (see Chapter 1, Response to [Concern 8](#)) eliminated this position and established an Office of Enrollment Management which reports to the new Executive Vice President and Provost. Directors of [Admissions](#), [Financial Aid](#), and the [Career Center](#) now report to the Executive Director of Enrollment Management. Staff is experienced, qualified, and sufficient to carry out their tasks. Most directors have over 10 years experience in their

fields, and the Executive Director has nearly 30 years of experience.

Admissions has 11 staff, including 7 recruiters, one of whom specifically recruits underrepresented students, and Financial Aid has 9 staff. Organized by territory, our recruiters have goal-setting and budget responsibilities. Freshman and transfer admissions are handled by Admissions, and international admissions are handled by International Programs. In 1995, a new director of Admissions was hired through a national search. She has worked to improve professional development opportunities and staff teamwork.

Early in 1994, the President invited a team of MTU administrators to join him in launching an initiative that would integrate marketing throughout the University to carry out its mission more effectively. In April 1996, responsibility for integrated marketing was assigned to the [Senior Vice President for Advancement and University Relations](#). He established an integrated marketing committee which identified the following goals:

- Update existing and develop new academic programs in order to meet the needs of society in an ever-changing marketplace.
- Improve the delivery of academic programs and services on and off campus.
- Develop a tuition pricing structure that will assure continued financial stability for the University while maintaining quality and access.
- Present a dynamic, consistent image to promote the benefits of academic programs and services to prospective students and to motivate financial support from prospective donors.
- Introduce marketing research into the University planning process and the evaluation of marketing strategies.

These goals were addressed in an integrated marketing report [2.9A] which will lead to the development of an integrated marketing plan for the University.

In addition to Enrollment Management staff, other professional staff, faculty, and students also play a significant role in recruitment. For example, faculty and graduate students in many academic units support on-campus recruitment by working in precollege summer programs coordinated by Youth Programs (Educational Opportunity) staff to introduce over 1,500 students and 25 teachers annually to Michigan Tech. The Departments of Humanities, Chemistry, and Biological Sciences, and the School of Business and Economics send faculty and staff teams to recruit local high school and community college students.

Among our strongest advocates and best recruiters are Michigan Tech students. They serve as residence hall counselors and teaching assistants for the precollege programs, provide campus tours, arrange high school visits, host on-campus programs, and attend recruitment college fairs with Admissions staff. MTSF has sponsored Red Carpet Days for high school students interested in attending Michigan Tech. The National Society of Black Engineers (NSBE) has sponsored the

PreCollege Initiative since 1995; it annually brings 20–40 interested high school juniors and seniors from Detroit to visit campus.

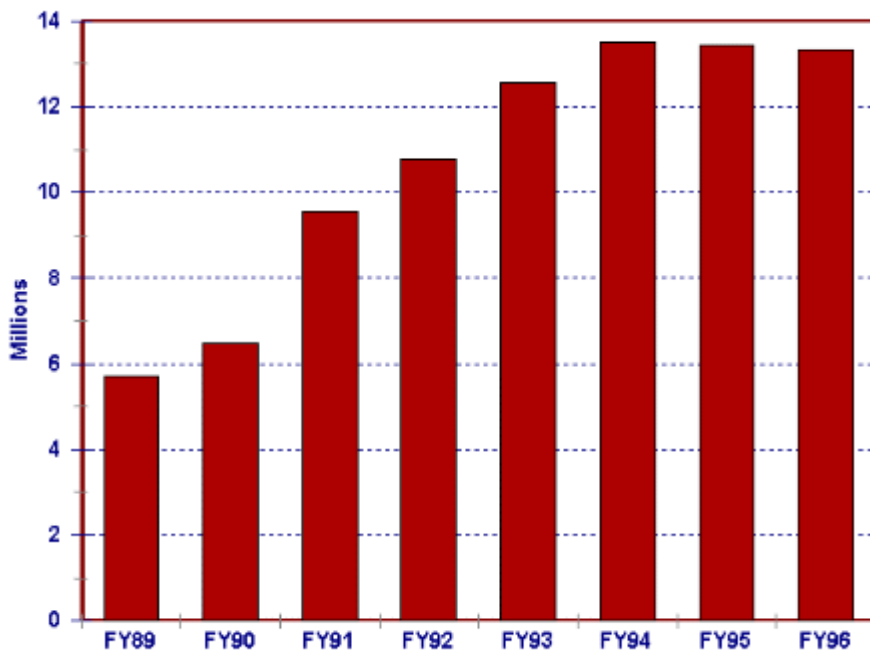
Financial Resources



In 1995, a survey conducted by Noel Levitz Center for Enrollment Management reported that the percentage of the budget (less than 1%) spent by Michigan Tech on enrollment management was consistent with other public universities, although private universities spent more (2%–3%). In addition to this centralized budget, many departments often spend their own funds on recruitment.

Although the number of undergraduate students has declined since 1990, expenditures in grants and scholarships have increased significantly (see Figure 9).

FIGURE 9. University Student Financial Support Expenditures.



Source: Audited Financial Statement

Note: FY91 is first year that includes the exceptional student tuition program.

While the amount expended is adequate, a better distribution could significantly impact recruitment, according to the Noel Levitz study. The extraordinary increase in FY91 is the result of including funds for the "Exceptional Student Award," (ESA) a program which was implemented in 1987 to attract high school students from Wisconsin, Minnesota, Illinois, and Ontario (students in the top 15% of their class) and children of current active MTU alumni (residents of any state, in the top 20% of their class); transfer students with a 3.25 GPA are also eligible. The ESA program provided a financial award which covered the difference between resident and non-resident tuition. In 1997, these awards were replaced by the National Academic Scholarship, valued at a fixed rate of \$5,100 annually.

The University not only awards institutional dollars for financial aid, it distributes aid from State, Federal, and other sources. In 1995/96, 63% of Michigan Tech students received financial support (including student employment and loans) worth \$36.3 million, over double the amount administered in 1988. In sharp contrast to the high national percentage of student aid which is allocated as student loans (57% of total aid in 1996), Michigan Tech students carry only 32% of their aid as loans. Michigan Tech students have a relatively low deb load upon graduation (\$9,354 in 1996). [\[1\]](#)

Physical Resources



All units within Enrollment Management now use BANNER®, an automated, integrated enrollment management system. All employees have personal computer workstations, and each unit has a WWW site and can communicate with students, parents, and alumni via e-mail. The *Viewbook* [7.6A2] is on-line. Teleconferencing is used to hold Admissions staff meetings with staff in downstate locations.



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Accomplishments

The American Association of State Colleges and Universities' Sallie Mae Retention Project named Michigan Tech as a model for other colleges and universities for the variety of programs that we offer to support retention [2.6F2].

General Enrollment

As a technological university, Michigan Tech succeeds in serving its traditional niche market. Over 65% of its students are enrolled in engineering and over 85% in engineering or science. While some departments, such as Mechanical Engineering/Engineering Mechanics, Chemical Engineering, and Civil and Environmental Engineering, have experienced very high enrollments given their levels of faculty, others such as Mining Engineering, Metallurgical and Materials Engineering, Geological Engineering and Sciences, the School of Forestry and Wood Products, and the School of Business and Economics, have excess capacity (see Appendix 6 and departmental self-studies [2.6] for [information on unit enrollment](#)). Controlling enrollments in some disciplines, while attempting to increase it in others, will prevent student-to-faculty ratios from becoming too high and laboratory capacities from being inadequate to provide a quality education.

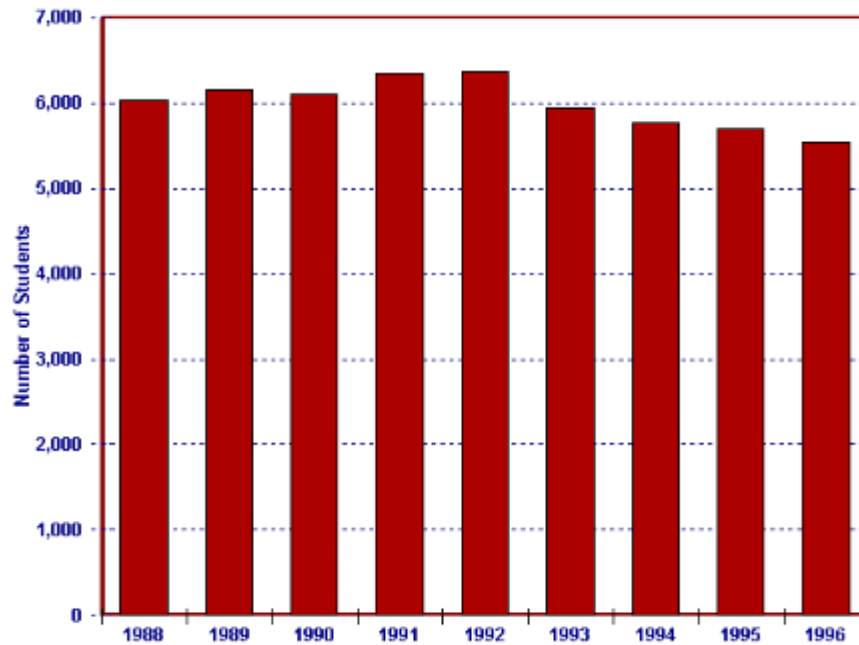
Overall enrollment rose steadily to a peak in 1992 and then declined. Fall 1997 numbers indicate that a turnaround in first-year enrollment has occurred (see Figure 10).

FIGURE 10. Undergraduate Student Enrollment

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Source: Institutional Analysis (Fall Headcount)

As explained in Chapter 1 (Response to [Concern 9](#)) there are three reasons for this decline:

1. raised admission standards in several engineering departments,
2. graduation of a large cohort which entered in 1990–92, and
3. declining numbers of 18-year-olds in Michigan.

In addition, interest in engineering and science among high school students has declined, and competition in Michigan has increased. Nonetheless, because our goals for increasing undergraduate enrollment by 2%–4% annually over the next five years are not unrealistic, it is clear we need to improve our recruitment process.

Michigan Tech is a public university, yet its remote location, niche offerings, and premium price for many disciplines differentiates it from regional, comprehensive universities and suggests that comparisons with private as well as public universities could be enlightening. The Fall 1995 National Enrollment Management Survey conducted by Noel Levitz indicated that the conversion rate from inquiries to applications for four-year public universities was 27.7% and for private colleges and universities 9.2%. Michigan Tech's 1996 conversion rate of 14% was assessed by Levitz to be weak; Levitz recommended we should achieve 21%. To obtain even this 14% conversion rate, we spend more than other institutions on a per student basis. According to Levitz' survey, the average four-year public university spent \$345 on recruitment, marketing, and admissions per enrolled new student, while Michigan Tech spent \$709 (\$946,200 for 1,332 new recruits); private colleges and universities spent \$1,562.

Some of this expenditure pays off when we look at the next set of conversions, from applications to acceptances to enrollees. Compared to our benchmark institutions in 1994, we did very well

(see Table 7).

TABLE 7. Conversion from Applications to Acceptances to Enrollees.

School	# of Applicants	% Accepted	% Enrolled
Missouri-Rolla	1,868	94%	47%
Clarkson	2,174	90%	29%
Michigan Technological University	2,622	85%	47%
Worcester Polytechnic Institute	2,772	84%	39%
Rensselaer Polytechnic Institute	5,110	80%	27%
Lehigh	6,397	69%	25%
California Polytechnic SLO	6,008	65%	40%
Carnegie Mellon	8,727	60%	23%

Source: University of Missouri Rolla, Retention Committee, 1995/96 Report, June 1996 [6.2B3]

This pattern of evidence suggests that our recruitment strategy needs to focus on increasing both inquiries and conversions from inquiry to application. Feedback from high school counselors to Admissions staff confirm this. They report a perception that Michigan Tech is only for the very highest caliber student. Our mean ACT composite score was 24.9 in 1988 and rose to 25.6 in 1996, compared to a national average of 20.9 and Michigan average of 21.1. Only the University of Michigan has a higher mean ACT in the State. This perception influences potential students with good academic records to self-select themselves out of the initial application process, or they are advised by school personnel not to apply. This perception needs to be changed. We need to market Michigan Tech as an academic experience which is rigorous and challenging but achievable within a supportive, team-oriented environment that has a great payoff for the student in placement, starting salaries, low debt upon graduation, and lifelong career opportunities. Another factor that inhibits recruitment is our physical climate and remote location, with limited access by public transportation; this was reconfirmed by the *Image and Identity Assessment Study* [2.9B].

We have adopted three strategies to improve recruitment:

1. recruit in our traditional engineering and science niche well in advance of college selection decisions,
2. expand our offerings beyond the traditional niche, and
3. recruit more aggressively both locally and outside Michigan.

To start recruitment in advance of students' college selection decisions, we have done two things. First, in 1996 we increased the

number of names of high school juniors purchased from Student Search from 10,000 to 20,000. Second, we began more aggressively to use our campus visit programs as recruitment opportunities. Michigan Tech supports an array of well established precollege programs, including summer youth programs and academic year outreach activities, to introduce and involve over 1,500 students, ages 12–18, with Michigan Tech’s academic departments [2.6F2]. These programs target traditional student populations as well as underrepresented students, three of which—[Women in Engineering](#), [Minorities in Engineering](#), and the Minority College Access/[Summer Youth Program](#)—are collaborative efforts between the University, corporations, and secondary schools [7.4A]. Admissions personnel had limited contact with these student alumni in the past but are now aggressively contacting students in the 11th and 12th grades about participation in all programs. In 1996, we held a Sneak Preview Program for 400 students and their families to experience residence hall life. We also actively marketed summer visits to MTU for high-school and community college teachers and counselors, which resulted in an increase in participation.

Although Michigan Tech has strong program offerings outside engineering and science, they were not seriously marketed until the early 1990s. We have begun to promote our expertise in business, humanities, education, and other fields in centralized recruitment efforts. As an incentive, a \$150,000 Provost Incentive Fund for Admissions in 1994/95 provided \$1,000 awards to 131 entering freshmen, 33% of which were dedicated to non-engineering students. In addition, academic departments which are undersubscribed have become more involved and have invested resources in recruitment. For example, the School of Forestry and Wood Products is co-sponsoring a summer precollege Multicultural and Natural Resources Program with Educational Opportunity and the U.S. Forest Service [2.6D], and Chemistry has adopted two Detroit area schools. Internal recruitment of internal transfers (students contemplating changing majors or leaving) is also increasing. In February 1997, 29 academic units participated in the first annual Opportunities Expo. This strategy also assists retention.

Because recruitment of local students (within a 100–250 mile radius) has not been a priority for most University departments, the University does not have a visible, local advertising presence (unlike one of its competitors for non-engineering students, Northern Michigan University). This is a concern which should be addressed. Several units have already begun to actively provide outreach to local and regional schools during the academic year: Physics—Rockets for Kids, 1997; Biological Sciences—Bioathlon, 1992–97; Engineering—Engineering Olympics, 1991–97; and Educational Opportunity—Girls + Math + Science = Choices, 1991–97. In addition, the School of Business and Economics schedules focused recruitment visits to community colleges located within a radius of 100–200 miles [2.6C] and the Native American Outreach Coordinator works closely with the three community colleges that have large numbers of Native-American students.

Finally, the Admissions Office has long recruited almost exclusively in Michigan. In 1996, after realizing the need to expand our key markets, the Admissions staff substantially increased their out-of-state visits, while maintaining their presence in the Michigan market.

Distance Education



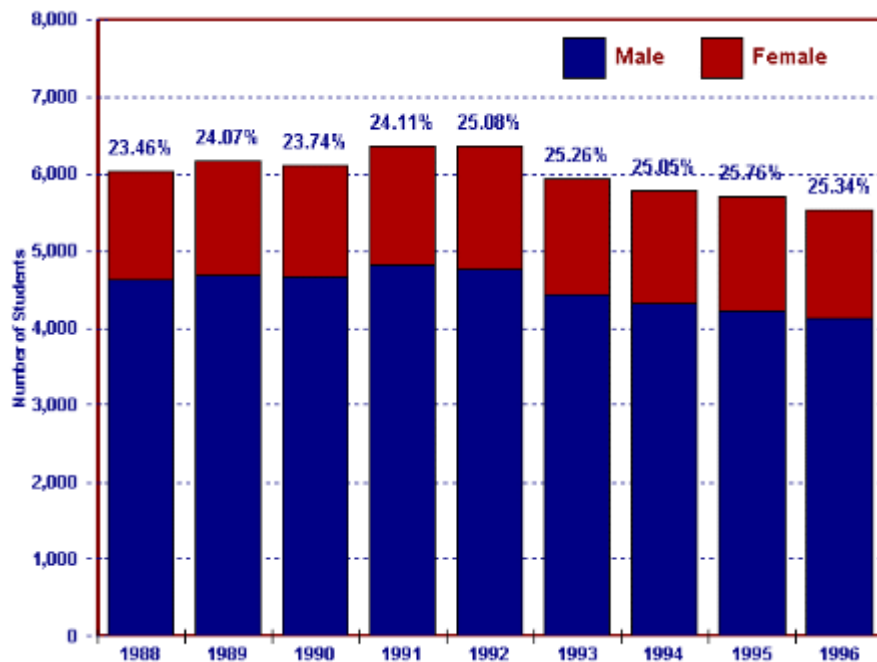
Another strategy for increasing enrollment is distance education. This will be discussed separately in Chapter 13.

Diversity in Enrollment

Concerns about underrepresented groups were addressed in Chapter 1, Response to Concern 2. Ambitious goals have been set for the [undergraduate enrollment of women and underrepresented groups](#). With respect to underrepresented groups, the Strategic Plan called for doubling the total number of students from these groups between 1992 to 1997. The [PCW](#) recently set a goal of 35% undergraduate women by 2001 [5.5C]. In 1996 the Retention Task Force recommended a goal of 5.5% undergraduates from underrepresented groups by 2001 and 12% by 2006. In 1986 the MPTF had set a goal of enrolling at least 300 African-, Hispanic-, and Native-American undergraduate students by 1994.

Although the University's initiatives to increase the number of women on campus have helped Michigan Tech meet or slightly exceed national percentages in engineering, we have not yet met our goals. Nationally, women as a percentage of undergraduate enrollment in engineering grew from 16% in 1988 to 19% in 1996, compared to undergraduate engineering growth at Michigan Tech from 16% to 20% during this period [6.2B2]. Total enrollment of women undergraduates at Michigan Tech grew from 23.5% to 25.3% (see [Figure 11](#)). Two strategies were recommended by the PCW to meet our goals: Increase targeted recruitment for non-engineering departments and increase support for the precollege Women in Engineering programs.

FIGURE 11. Undergraduate Student Enrollment—Gender Distribution.



%=Percent of Women to Total Enrollment

Source: Institutional Analysis (Fall Headcount)

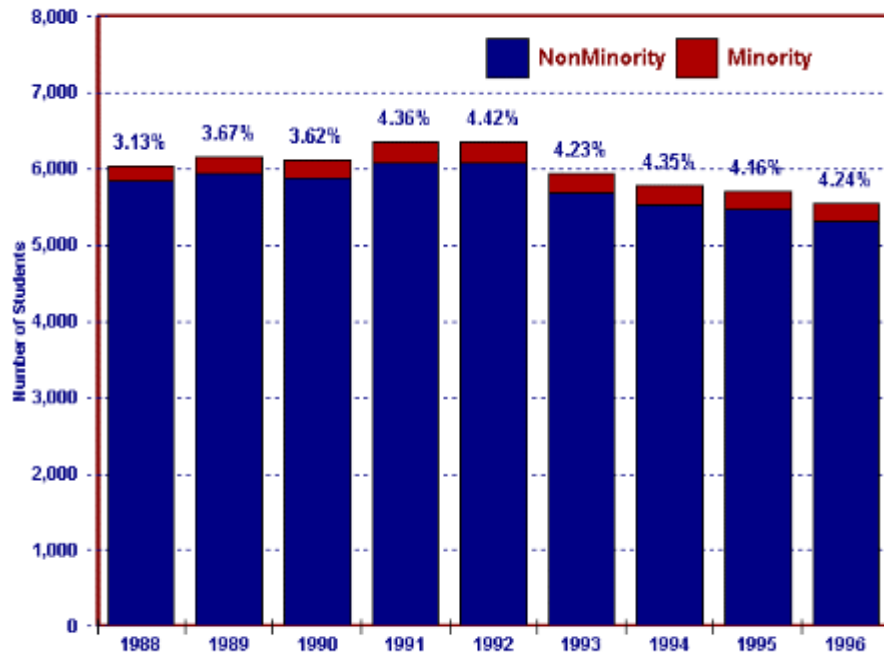
Since 1988, the number of underrepresented students increased by 24%, from 189 to 235 in 1996. Enrollment peaked at 281 in 1992, but has declined since then (see Table 8). As a percentage of total undergraduate enrollment, underrepresented-group representation improved from 3.1% in 1988 to 4.4% in 1992 and has remained relative stable thereafter (see Figure 12). Clearly the goal of doubling underrepresented-student enrollments has not been achieved. However, the more realistic goal of 5.5% underrepresented undergraduate enrollment set by the Retention Task Force appears achievable.

TABLE 8. Undergraduate Student Enrollment—Underrepresented Groups.

	1988	1989	1990	1991	1992	1993	1994	1995	1996
Asian American	90	98	81	104	87	82	85	74	68
African American	36	57	68	88	111	87	87	89	82
Hispanic American	32	40	36	40	43	43	31	30	42
Native American	31	31	36	45	40	39	48	44	43
Total	189	226	221	277	281	251	251	237	235

Source: Institutional Analysis (Fall Headcount)

FIGURE 12. Undergraduate Student Enrollment—Underrepresented Distribution.



%=Percent of underrepresented groups to total enrollment.

Source: Institutional Analysis (Fall Headcount)

We have particularly focussed on improving enrollment of African-, Hispanic-, and Native-American undergraduates. By Fall 1996, 167 students in these categories were enrolled on campus, a significant increase from the 1988 figure of 99, but a decline from a high of 194 in 1992 when total enrollment peaked—and considerably shy of the MPTF goal of 300. Strategies for improving our success include:

- improved efforts to introduce Michigan Tech to teachers and counselors in secondary schools with high populations of underrepresented students (e.g., the Secondary Educators' Fellowship Program),
- expanded recruitment beyond Detroit, and
- continued support for the Native American, Minorities in Engineering, and Minority College Access/Summer Youth Programs.

Educational Opportunity is preparing a report that describes the University's efforts to build programming for the benefit of students from underrepresented groups which will include a recommendation to develop a strategic plan for recruitment of underrepresented students based on Retention Task Force recommendations [5.4A].

The University's involvement in a number of external consortiums, partnerships, and organizations also facilitates recruitment of underrepresented students ([see Table 9](#)).

TABLE 9. Minority Partnerships

Organizational Membership and State Programs	Facilitating MTU Department
Michigan State King-Chavez-Parks	

Program <ul style="list-style-type: none"> • College Day • Future Faculty • Visiting Scholars 	Educational Opportunity
Graduate Education for Minorities	Educational Opportunity Dean of Engineering
National Association of Minority Engineering Program Administrators	Educational Opportunity Student Affairs
Women in Engineering Programs Advocate Network	Educational Opportunity Dean of Engineering
State of Michigan Select Student Support Services Program	Educational Opportunity (PI) General Engineering Mechanical Engineering/ Engineering Mechanics Student Affairs Dean of Engineering
State of Michigan Michigan College and University Partnership	Educational Opportunity (PI) Admissions Gogebic Community College Bay de Noc Community College
National Association of Student Personnel Administrators	Student Affairs
Michigan Space Grant Consortium	Educational Opportunity
State of Michigan Wade McCree Scholars Program	Educational Opportunity President/Provost
Detroit Area Pre-College Engineering Program	Educational Opportunity Admissions

In 1988, the NCA Evaluation Team expressed particular concern for Native-American enrollment at Michigan Tech. The number of Native-American undergraduate students has increased from 31 to 43 (see [Table 8](#)). In 1989 the Outreach and Multiethnic Program division was established, and in 1996 a Native American Outreach Coordinator was hired. The Coordinator's assignments include working to increase Native-American enrollment at Michigan Tech for both first-year and transfer students. Also in 1989, the American Indian Biological and Computer Science Workshop for students ages

12–16 years was initiated to increase career awareness and help build academic skills of precollege Native-American students, as well as encourage them to prepare for, and consider, postsecondary education.

Student Marketing



The 1988 report prepared by the NCA Evaluation Team for Michigan Tech expressed some concern that the Admissions staff and University marketing pieces did not always convey the same message. Improved administrative structure and staffing have increased coordination in this area, which has resulted in more creative, uniform admissions and marketing pieces. In addition, a University-wide marketing committee under the direction of the Senior Vice President for Advancement and University Relations is now developing an integrated marketing plan.



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Continuous Improvement

Current enrollment generates sufficient resources to allow the University to achieve its stated purposes of providing a quality education; however, the heavy emphasis on engineering and sciences exposes the University to the risk of continuing cyclical changes in the demand for engineering and science graduates. The challenge is to attract a wider array of students in targeted areas. The integrated marketing plan under development promises to achieve a balanced marketing strategy that emphasizes the University's recognized strengths, but also highlights its other less-recognized quality programs.

A new emphasis on University-wide, as opposed to departmental, enrollment planning will help us meet our overall enrollment goals. However, individual academic departments continue to have limited authority to set or influence recruitment goals, which may not be wholly consistent with University goals. This creates some confusion for Admissions, which is held ultimately accountable for total enrollment, yet appears to have some responsibility for meeting departmental goals as well. An Admissions Advisory Team that works with Admissions to develop sound, long-term goals which realistically address our capacities and growth potential in all departments would facilitate recruitment planning.

The need to improve recruitment strategies and processes has been identified. We are just beginning to take advantage of our ability to track recruitment patterns, which is now being examined by the TQE RAISE (Recruitment Activities Increase Student Enrollment) team. However, Admissions' budget is not adequate to increase recruitment significantly in neighboring states and the University has no new internal funds to expand precollege programs for women and underrepresented students. External funds are being solicited, but these are also declining and threatened by recent rulings against affirmative programs.

Although the implementation of BANNER® has made it easier for financial aid staff to develop reports that assist in determining financial awards and to notify students of the status of their financial aid loan checks, our current financial aid process could be improved to achieve the best impact on

enrollment. Prospective students receive information about our estimated financial aid packages later than aid packages from some competing institutions. Our enrollment management recruitment team working through Information Technology, have employed consultants from Noel Levitz to implement their financial aid leverage analysis program. Each of the last three years, we have adjusted our institutional criteria to maximize the yield of quality applicants. Michigan Tech began participating in the Federal Direct Lending program in Fall 1997. This program should make borrowing more convenient for students and parents to finance college costs. Hopefully, we will not see any significant increase in the relatively low debt load of our graduates or any increase in our extremely low student loan default rate (2.3% 1993/94 Official Cohort Default Rate for FFEL loans).

Integrity



Recruitment material such as the *Viewbook* [7.5E], department fliers [7.5], and the *Student Handbook* [1.2C] are generally accurate and consistent in their representation of the University and its purposes. Current materials more accurately portray the physical climate and the representation of women and underrepresented groups than did some past publications. Informational pieces such as the *Commitment to Diversity* brochure [7.5B] help demonstrate the University's support for ethnic diversity.

Written procedures for the admissions process reflect the actual practice. The increased willingness by Admissions personnel and academic departments to review non-traditional admissions information (letters of recommendations, student experiences, etc.) as well as traditional measures (ACT scores, class rank, etc.) positively impacts the University's ability to enhance its diversity.

Evidence that the University accurately represents itself to students and meets their expectations is provided by the Fall 1996 USG survey of first-year students (response rate of 30%) and the Spring 1997 USG survey of first-, second-, and third-year students (response rate of 15.5%) [6.2B2]. Eighty-five percent of students surveyed responded that their experience at Michigan Tech was about what they expected or better.





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SWOT Analysis

Since 1992, enrollment has declined, but recent efforts to restructure Enrollment Management, improve recruitment practices, and develop an integrated marketing strategy will help us meet our enrollment goals. Our engineering and science emphasis and our remote location make it more difficult for us to diversify by major, gender, and ethnic group, but we have developed multiple strategies to meet our diversity goal.

In summary, the strengths, weaknesses, opportunities, and threats with regard to recruitment are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • High quality students • Academic reputation • Placement record • Precollege and outreach programs • Enrollment management restructuring • Student and alumni networks • Growing involvement of faculty in recruitment • Conversion rate of applicants to enrollees 	<p>Weaknesses</p> <ul style="list-style-type: none"> • No unified marketing strategy • Little advertising • Perception that MTU standards are too high • Late financial aid notification • Insufficient recruitment budget • Low conversion rate from inquiry to application • Insufficient diversity • University and departmental goals not aligned
	

Opportunities

- Demographics for women and underrepresented high school graduates
- Transfer students from community colleges
- Students in non-engineering disciplines
- Growing importance of technology to society

Threats

- Competition from other institutions
- Distance from the pool of potential students
- Diminishing external support for youth programs and underrepresented groups
- Recent rulings against Affirmative Programs
- National decline of interest in engineering by high school students

External Assessment of the Environment

Action Plan



To take advantage of opportunities and remedy concerns with regard to recruitment, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

	What	Who
1	Establish an Admissions Advisory Team to align University and departmental recruitment goals.	<ul style="list-style-type: none">• Executive Vice President and Provost
2	Budget for enrollment growth.	<ul style="list-style-type: none">• Executive Vice President and Provost
3	Increase academic department involvement in recruitment.	<ul style="list-style-type: none">• Deans and Department Chairs
4	Fund a response-handling center for first-inquiry students.	<ul style="list-style-type: none">• Admissions
	Establish an early financial-aid-estimator program.	<ul style="list-style-type: none">• Financial Aid

6 Take more advantage of youth programs as recruitment opportunities.

- Admissions
- Educational Opportunity

7 Build more partnerships with community colleges and international institutions.

- Admissions
- International Programs
- Educational Opportunity

This action plan will be integrated into the strategic planning process for 1998/99.

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Retention

Resources

The University has significant processes and services in place campus-wide to encourage retention. Academic departments have faculty and staff advisers, learning centers and tutors, and orientation programs and courses (see Chapter 3). Student Affairs and Educational Opportunity have 20 experienced and qualified staff members who provide services and programs to assist students in their personal and professional development. In 1996, a Director of New Student Orientation and First Year Programs (Student Affairs) was hired. A new position, the Associate Director of Residence Life, was created and filled in 1995 and works cooperatively with Student Affairs to provide developmental programming in the residence halls. Benchmarking indicates that Michigan Tech’s programming to encourage retention is comparable and in some cases more extensive than peer institutions [6.2B2, Chart 7].

In 1992, the [PCW](#) and the PCD (Presidential Commission on Diversity) were formed to respond to concerns associated with the recruitment and retention of women and underrepresented groups and to identify strategies to improve the climate for all students. To develop an overall, unified approach to retention, in 1995 the University created a Retention Task Force. Following a recommendation of the Retention Task Force, Educational Opportunity will regularly distribute an analysis of retention and graduation rates. A Standing Committee on Retention will be established in 1997/98.

Financial resources to expand retention efforts are limited and often provided by external grants, such as the Michigan Department of Education’s Select Student Support Services Project grant to support our RISE (Retention Initiative in Science and Engineering) programs.

Accomplishments



Resources dedicated to retention have allowed us to achieve retention rates comparable to our benchmark and other nationally recognized peer institutions (see Table 10).

TABLE 10. Graduation Rate and Relative Retention Index for Benchmark Institutions.

				Average	Average Non-
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Institution	Minority Graduation Rate (%)	Non-Minority Graduation Rate (%)	Relative Retention Index (%)	Minority Graduating Class (1990–93) (N)	Minority Graduating Class (1990–93) (N)
Georgia Institute of Technology	70.3	68.6	102.5	120	1067
Colorado School of Mines	70.3	57.3	90.7	13	246
Michigan Technological University	50.1	67.9	73.8	15	947
Lehigh University	57.8	87.4	66.1	9	358
Rensselaer Polytechnic University	50.2	83.2	60.3	44	590
University of Missouri-Rolla	36.8	73.7	50.0	16	578

Source: 1994 AASCU/Sallie Mae Retention Survey Institutional Report

The ambitious goals set by the Retention Task Force—95% retention after the first year, 90% after the second, and 85% graduating after five years [5.4A]—have not been met, but show our strong commitment to retention, as do the activities and programs aimed at retention which we support.

The Retention Task Force Report [5.4A] describes the activities and programs that are positively impacting retention progress on our campus and offers a framework for addressing retention. The accomplishments in curriculum and academic support systems and programs discussed in Chapter 3 all impact retention, and the role of faculty interaction with students must be emphasized. This is particularly true for retention of women and underrepresented groups. In 1992, the Multicultural Advisory Committee recommended the Efficacy seminars for faculty, to identify early signs of academic difficulty for "at risk" students (see [Chapter 3](#)). The PCW Climate Study identified a need for more visiting and permanent faculty role models for women and underrepresented groups. More women and underrepresented faculty have been hired (see Chapter 1, Response to [Concern 2](#); and [Chapter 6](#)), and, in addition, a Visiting Women and Minority Scholars Program and the Visiting Women Lecturers Series were established in 1996.

The Multicultural Advisory Committee also recommended more quality "peer support" programs. Students have been significantly involved in a variety of efforts to generate peer support:

- the Peer Orientation Leaders organization, trained by Student Affairs, introduce first-year students to academic life;

- the Peer Academic Leader (PAL) Program pairs juniors and seniors with first- and second-year "pals," and is in its second year of a three-year pilot (funded by a grant);
- some academic departments provide opportunities for juniors, seniors, and graduate students to work with first- and second-year students; and
- student organizations such as Omicron Delta Kappa ([ODK](#)), the Black Student Association ([BSA](#)), American Indian Science and Engineering Society ([AISES](#)), National Society of Black Engineers ([NSBE](#)), Society of Automotive Engineers ([SAE](#)), Blue Key Fraternity, and Michigan Tech Student Foundation ([MTSF](#)) work with University administration and academic departments to provide leadership, personal and professional development opportunities, and recreational, enrichment, and academic support activities and programs for their peers.

Students are also involved in efficacy work through The Guaranteed 4.0 Workshop, which is offered regularly for student groups and was funded through a grant.

As discussed in Chapter 1, Response to [Concern 5](#), we have explored developing a First Year program. A serious step in this direction was taken in June, 1997, when Educational Opportunity and the PAL sponsored a well-attended workshop on "Designing Successful Transitions" conducted by the National Research Center for the Freshman Year Experience and Students in Transition located at the University of South Carolina.

In 1994 the PCW completed a Climate Study, which made recommendations that impact the University's recruitment and retention strategies [5.5C]. An overall campus climate of satisfaction which contributes to retention is evidenced by the positive results of the Student Affairs' Student Satisfaction Survey [2.6H11], the willingness of students to work on recruitment activities, the willingness of alumni to support the University, and the small number of concerns raised by the PCW and PCD [5.5C, 2.6H2]. The Parade of Nations, Multiethnic Celebration, and Human Relations Series during fall term are activities which contribute to a positive climate for international and underrepresented students, as do new activities in the local schools, periodic workshops, cultural activities and events such as the 1996 and 1997 Pow-Wows. The retention rates for underrepresented students varies by group, but four-year retention varied from 10%–20% and is lower than the rate for all students. Although it does not meet University goals for all students, it is comparable or better than our benchmark institutions.



Continuous Improvement

It appears that sufficient resources will be available to maintain the University's current retention efforts. It is uncertain if additional resources will be available to support enhancement of current efforts or new initiatives recommended by the Retention Task Force, because much of the current effort has been externally funded.

Retention and graduation rates have always been available through Institutional Analysis and are often required for State and Federal reports. However, they have not been regularly distributed and reviewed, particularly at the department

level, for planning purposes. Educational Opportunity will work with Institutional Analysis to collect and distribute the data and the new Standing Committee on Retention will track progress. Established retention processes are also amenable to review and planning. The Retention Task Force has already identified areas for improvement and recommends periodic review and evaluation. The Standing Committee will work to increase awareness of "best practice," and provide ongoing recommendations to senior administrators to meet our retention goals. Educational Opportunity's programming review for underrepresented groups will be completed during 1997/98.

The Retention Task Force Report [5.5A] emphasized that the well-established Learning Centers, the University's annual schedule of diversity-related programs, and the variety of opportunities for students to engage in leadership, team, and research activities all enrich educational experiences and positively impact retention. These programs help students develop a connection to Michigan Tech, which is a significant component of our retention strategy. The Retention Task Force also identified six areas that would have an immediate, positive impact on retention:

1. academic advising,
2. faculty development that focuses on teaching,
3. student orientation (first-year experience),
4. course availability,
5. change to semesters, and
6. retention programming.

The first five areas were discussed in [Chapter 3](#), and retention programming has been discussed here. The Executive Vice President and Provost has requested that each academic department incorporate Retention Task Force recommendations into their strategic planning. These are not yet consistent across campus. However, the Colleges of Engineering and Sciences and Arts have committees exploring first-year experience initiatives for possible future implementation, and the New Student Orientation and First Year Programs Director has a broad-based committee which is also exploring opportunities.

New opportunities for role models will be provided by the Presidential Council of Alumnae and efforts to recruit women and underrepresented faculty will be continued. For our underrepresented students, a faculty and staff who look like them is especially important and impacts their ability to adjust to Michigan Tech.



Integrity

University publications such as the [Student Handbook](#) [1.2C] and *Commitment to Diversity* brochure [7.5B] accurately identify resources available to students which improve their opportunity to succeed, and thereby enhance retention. The University vision is, generally, accurately portrayed in official and marketing publications. However, a few areas, which may affect retention, where our publications do not always match student experience are:

- the *Undergraduate Catalog* [1.3A] promotes individual effort but students are increasingly asked to work in teams (the appropriate balance

between individual and team effort and rewards is not yet well delineated);

- the *Undergraduate Catalog* [1.3A] and brochures do not always accurately depict the physical climate—winter and snow; during which most students attend Michigan Tech; and
- students are promised a caring and involved faculty, but eight student focus groups conducted by the Retention Task Force found that students do not always find a nurturing environment due to faculty research obligations, teaching loads, perceived undervaluing of quality teaching efforts, and personality [5.4A].

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SWOT Analysis

A comprehensive system of programs in place to assist students has allowed Michigan Tech to achieve a good retention rate. However, improvement is necessary to meet our goals, particularly for underrepresented students. A significant concern is the continued availability of external funding to support retention efforts.

In summary, the strengths, weaknesses, opportunities, and threats with regard to retention are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Retention rate • Academic preparation of students • Learning Centers • Academic support programs for students and faculty • Role models for women and students from underrepresented groups • First-Year Orientation Coordinator (new position) • Outreach and Multiethnic Division • Diversity programming for faculty and students • Student peer leadership programs 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Academic calendar • Advising • Course availability • Few permanent role models for underrepresented students

SWOT ANALYSIS

Opportunities

- Renewed national attention on education
- Increased Federal financial aid

Threats

- Diminished external financial support programs
- Remote physical location for underrepresented students

External Assessment of the Environment

Action Plan



To take advantage of opportunities and remedy concerns with regard to retention, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.


What	Who
1 Implement the Retention Task Force recommendations with adequate funding.	<ul style="list-style-type: none">• Executive Vice President and Provost• All Departments
2 Regularly assess progress toward retention goals.	<ul style="list-style-type: none">• Standing Committee on Retention
3 Develop meaningful and visible rewards for faculty and units that significantly contribute to retention.	<ul style="list-style-type: none">• Vice Provost for Instruction
4 Actively and purposefully encourage students and faculty to participate in diversity-related activities.	<ul style="list-style-type: none">• University Administration
5 Continue to administer the Student Satisfaction Survey regularly, and disseminate results.	<ul style="list-style-type: none">• Student Affairs

Increase the number of women and underrepresented faculty and staff.

- University Administration
- All Departments

This action plan will be integrated into the strategic planning process for 1998/99.

ENDNOTES

1. *U.S. News & World Report*, Sept. 8, 1997, p. 97. [BACK](#) 

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University Goal 1: Sustain and Enhance the Quality of Undergraduate Education

Subgoal 3: Provide an Environment that Enhances the Quality of Student Life

The Goal 1.3 Committee evaluated the ways in which Michigan Tech enhances undergraduate student life. Student life is supported by student services and student organizations and can include activities directly related to the educational experience, such as academic advising, judicial affairs, and library service, as well as to opportunities for personal, social, political, and cultural development outside the classroom, which indirectly influence academic performance. Michigan Tech has no one department of student life; many departments serve students in a variety of ways. Student services that directly support the academic course of study, such as the Registrar, academic advising, and student organizations closely linked to academic departments, are discussed in Chapter 3 under "Academic Support." The Library and Information Technology are discussed separately in Chapter 10. In this chapter, we will evaluate the quality of other campus-wide student services and student organizations which enhance the quality of student life outside the classroom.

This chapter draws on the Goal 1.3 Committee Report [6.2B3], the Student Affairs Self-Study [2.6H11], Educational Opportunity Self-Study [2.6F2], and the college and school self-studies (see [Appendix 6](#)). Results of student surveys conducted by the Goal 1.3 Committee are discussed in their report. Please see these reports for additional information.

Patterns Of Evidence

Purposes

The University mission and vision suggest an appropriate climate for student life by stating that the University should be an educationally challenging, student enriching organization and a leader in promoting diversity, creativity, leadership, and teamwork among students. Many departmental mission statements echo this, as do many brochures produced and distributed by academic and academic support units. Student organizations' constitutions and bylaws emphasize self governance and developing a spirit of progressive leadership. Admissions provides potential students with information about clubs and organizations in *News & Views* [7.5J], and the Organizations Fair during orientation week distributes literature about student life.

In its statements, the University recognizes not only the role it plays in the lives of students, but also the role students play in the life of the University, as they contribute to the University community. Nonetheless, academic department recruiting brochures rarely discuss student life, and the academic department self-studies contained little discussion of student life or of how the development of qualities such as leadership and teamwork were evaluated. Although many departments clearly foster student life activities, a stronger bridge could be built between the academic experience and the student life experience at Michigan Tech.

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Resources

Improvements in and enhanced resources for [student services](#) demonstrate the institution's commitment to improve student life. There has been significant restructuring and a commitment to new positions and facilities.

Administrative Structure - Student Services

Student services is defined as any office (other than academic departments) that provides direct service to students or interacts with students on a frequent basis. Until 1992, all student services, from admissions to international students to counseling, reported to a Vice President for Student Services. Administrative restructuring (see Chapter 1, Response to [Concern 8](#)) eliminated this position, and all student service units now ultimately report to the Executive Vice President and Provost through a decentralized system. Some student services were discussed in Chapters 3 (Registrar) and 4. In this chapter we focus on six student service units:

1. Student Affairs (including Counseling Services),
2. [Career Center](#) (Enrollment Management),
3. Educational Opportunity,
4. [Residential Services](#) (including Residence Life),
5. [Retail Operations](#), and
6. [Athletics](#).

Despite numerous changes in administrative structure since 1988 [6.2B3], student services remains loosely coordinated. Evaluation of student services during the self-study process led many departments to conclude that student services was understaffed and to argue for continued restructuring. Better coordination through centralizing operations of student services may generate more efficient and effective service delivery by strengthening the links between student service units. Michigan Tech has demonstrated progress in addressing understaffing in some units with the addition of new positions.

Student Affairs was reorganized in 1994 to assign responsibilities along functional lines (academic standards, discipline, Greek life, student organizations, ADA-related issues, student leadership development, and personal and

academic counseling) for service efficiency among the seven professional staff. Three professionally qualified counselors staff [Counseling Services](#). Since 1988, three new positions (Associate Dean, Director of New Student Orientation and First Year Programs, and Associate Director of Residence Life) were added and hired through national searches, and the Dean of Students was promoted to Vice Provost for Student Affairs. In Spring 1997, the Associate Director of Residence Life was transferred to Residential Services; the appropriateness of this transfer is a matter of some concern because this position manages student life programming rather than traditional residential operations.

Educational Opportunity has grown since 1988 through reorganization and the addition of 7 staff (3 in programming for underrepresented students) bringing the total to 15 staff in 4 divisions—Precollege Programs, Outreach and Multiethnic Programs, Conferences and Institutes, and Summer Session. Educational Opportunity relies heavily on student personnel; it employs 15–25 students on a seasonal basis. New positions since 1988 include Coordinators of Outreach and Multiethnic Programs, Native American Outreach, and the English as a Second Language (ESL) Adventure Program, as well as an Assistant Director of Special Academic Programs.

[Residential Services](#), which includes Residence Life, Residence Halls, Dining Services, and University Apartments and [Retail Operations](#), which includes the MUB (Memorial Student Union), Student Bookstore, SDC (Student Development Complex), and other athletic facilities emerged from reorganization of the former Auxiliary Enterprises Department in 1995/96. They are decentralized, functional, flexible, and student-driven operations. Both units rely heavily on student personnel: Retail Operations employs 90 full-time staff and 200 students, and Residential Services employs 110 full-time staff and 374 students. The residence hall staff is now available on a 24-hour basis, and an Associate Director of Residence Life was hired in 1995 to coordinate the development of an educational residence hall living program. Although there is limited University sponsorship of social and educational programs in the residence halls due to limited staffing, selection and training process for Residence Assistants has been initiated as well as programming models typical in other residence life programs. Dining service is now centralized under an Associate Director to improve service across campus.

[Athletics](#) has added 8 staff since 1988 for a total of 25 staff. Many staff are also Physical Education faculty. Sixteen staff members coach hockey, men and women's basketball, football, women's volleyball, Nordic skiing, track and field, and tennis. Swimming and indoor track have been eliminated as part of the athletic program since 1988 due to our location and cost.

In the last twenty years, student services has become a professional career path. Middle- and upper-management staff have advanced academic degrees in student personnel administration, higher education administration and student development and counseling. The long tenure at Michigan Tech of many of our student service professional staff, and the difficulty of obtaining new professional qualifications because of our remote location, has led many staff to develop professional skills on the job. However, since 1994, national searches have filled key student services positions with personnel with professional qualifications in the field.

Administrative Structure - Student Life



Student life is active at Michigan Tech throughout the year. [Student organizations](#) initiate most student activities outside the classroom (professional student clubs were discussed in Chapter 3). All student organizations are registered with the Office of Student Affairs and have a faculty (66%) or staff adviser. Each year, over 150 student organizations [1.2C] sponsor events ranging from social activities (35%), community service projects (25%), leadership programs (20%), and substance abuse awareness/relationship awareness activities (10%) [6.2B3]. Although the majority of programs focus on social and recreational aspects of student life, which are important to student development and reduce stress, programs on substance abuse awareness, stress management, time management, and study skills provide timely information for student development.

[University Cultural Enrichment](#) coordinates and administers the activities of the three major campus programming boards: [MTU Student Entertainment Board](#), the Memorial Union Board, and the Committee for Campus Enrichment, an appointed nine member faculty advisory committee appointment by the Provost. These boards are responsible for providing a broad spectrum of events that stimulate the cultural and intellectual life at Michigan Tech. Activities included national and international theatre and dance touring companies, orchestras and other musical ensembles, performing artists from a variety of disciplines, and lectures by leading figures in politics, technology, science and the humanities. All events are open to the public. University Cultural Enrichment publishes an annual calendar detailing all performances and public lectures on campus.

Students participate in shared governance through [Undergraduate Student Government](#) (USG). Special interest political groups are also active on campus. Many departments assist in the development and implementation of student-sponsored programs through the work of faculty and staff advisers, or, in the case of Winter Carnival, through Facilities Management's countless personnel hours devoted to snow

removal and delivery for the construction of snow statues.

Nonetheless, there are some weaknesses with respect to student activities. There is

1. no comprehensive coordination of student events,
2. no tracking of activities and projects over time to determine the value of programming and its impact on student development, and
3. advising of student organizations is not always effective.

Attendance at workshops for advisers has been low, and it is often difficult to find faculty and staff advisers who have sufficient time to devote to effective advising. Structured opportunities for students to socialize among their peers and with faculty and staff, such as K-Day, are limited. New campus traditions where students, faculty, and staff can come together would enrich our campus community.

Financial Resources



Expenditures in student services have fluctuated since 1988, in large part because of several administrative restructurings, most notably the elimination of the Office of the Vice President for Student Affairs. However, the delivery of student services has received additional investments over the past several years, including the creation of the positions described in "[Administrative Structure](#)."

As at most public institutions, student organization activities are funded primarily through a student activity fee, student fundraising, or University allocation to specific programs. The student activity fee was established in 1990 at \$30/student/year, and has not been increased. In 1996, student activity fees totaled approximately \$83,000. USG administers funds from student fees and makes decisions about allocations. More student groups are soliciting support from USG, which suggests it is time for USG to conduct a comprehensive examination of the distribution and impact of the student activity fee as it relates to use, delivery, and quality of activities sponsored by student groups. In addition to fees, the Offices of the President, Provost, Student Affairs, Educational Opportunity, and University Cultural Enrichment have sponsored numerous student activities, such as the BSA (Black Student Association) Retreat and Wild Orientation Way. A generous grant from the Van Evera Foundation has provided funding for a well-attended annual Distinguished Lecture series. Improved University allocations for student activities should be pursued through the strategic planning process.

Physical Resources



Numerous enhancements to physical facilities have improved student services since 1988. These activities include

- a remodeled and expanded [MUB](#) (see [Chapter 11](#)), including a significantly larger bookstore;
- a significant increase in access to computing facilities (see [Chapter 10](#));
- a new 12,000 sq. foot Career Center (The [Meese Center](#));
- a health service clinic at Sharon Center in Houghton with upgraded student health services (plans are being developed for a campus health center);
- a Counseling Services facility now centrally located in the Hamar House, which increases privacy of service delivery;
- new weight room equipment and a climbing wall in the SDC;
- the relocation of Public Safety to Wadsworth Hall, a larger and more central location;
- the offices for Student Affairs were enlarged and remodeled; and
- the relocation of Educational Opportunity to larger, remodeled offices.

University sponsored athletic facilities such as the golf course, ski hill, and bowling lanes, and the intramural program also contribute to student life, as does the healthy environment of the Keweenaw peninsula, which invites all types of outdoor experiences for students.

However, space for student activities of all sorts is limited. Despite its 1989 remodeling, the MUB is still inadequate to accommodate our campus population and to serve as a student center for cultural, social, and retail opportunities [2.6H5]. We have provided more study space in the residence halls and Library, but installation of new student organization offices in the MUB decreased meeting room space. Social space remains limited, particularly for commuting students. Lack of study and social space is particularly problematic given the physical climate of long, cold winters. The lack of coordination among student organizations results in organizations scheduling against each other for limited space to conduct major events in the MUB, SDC, and ROTC building. On a positive note, the addition of a Performing Arts Center will provide new space for cultural programming and also social space for some student performing-arts organizations. Ground breaking for the long anticipated Performing Arts and Education Center is scheduled for May 1998 with completion expected in December 1999. The Center will house a 1,200 seat theatre/concert hall with a fully equipped stage and will have a major impact on the cultural life of Michigan Tech and the surrounding communities. Some programming endowments are in place.

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Accomplishments

Student Services

Student service departments are effective at delivering the services they promise and living up to their collective goal to create the best possible environment for the professional and personal growth and development of students. Many units have made significant progress toward achieving their goals. The number and variety of achievements dedicated to promoting diversity, creativity, leadership, and teamwork in student life points to fulfillment of the University mission. Surveys of faculty, staff, and students conducted by Goal Committees [6.2B4, 6.2B7, and 6.2B3] showed overall satisfaction with student services and a belief that progress is being made. Nonetheless, satisfaction with departments varies.

Many student services and academic programs are linked and were discussed in Chapter 3 under Academic Advising and Academic Support. Other aspects of this linkage, such as scholastic standards and academic integrity, are discussed below.

Student Affairs has made progress on many fronts, from standards to student leadership. As the numbers of students entering college with learning disabilities increases and as substance-abuse problems grow, Student Affairs has responded by providing more services.

- A new *Student Handbook* [1.2C], which incorporates new policies (discussed below under "[Integrity](#)") and was prepared with significant input from students, was completed and distributed in 1995 and is now available on the WWW.
- The first year experience has been enhanced through "Managing the Maze" seminars, a first year newsletter, and working with faculty for early intervention.
- New academic standards rules written in 1990 and updated in 1993/94, outline criteria for good academic standing, such as number of terms on probation and dismissal and reinstatement requirements.
- BANNER® (1993/4) is used to detect students who are experiencing academic difficulty and intervene in a more timely manner.

- A new policy for dropping courses (1995) decreased the number of students signing up for courses with no intention of completing them. Students can now drop a course up to the sixth week of class, but a drop after the third week is noted on transcripts with a "W" (withdrew). It is predicted that this policy will lead to more timely completion of course work and earlier graduation.
- Significant new student leadership activities were initiated, include LeaderShape, a six-day workshop conducted in 1995–97; a Leadership Institute established in 1996; construction of the Team Effectiveness Challenge Course (1996); an expanded Omicron Delta Kappa Leadership Week; and an annual student leadership banquet.
- Peers Offering Wellness Education and Resources is an "on-the-road" educational program provided by Counseling Services for student groups, Greek organizations, and residence halls.
- Enhanced services provided to students with learning disabilities include additional support to arrange for equipment, proctoring of exams, interaction with faculty, and increasing faculty awareness of learning disabilities.
- Proactive measures were taken to minimize alcohol and substance abuse, including making K-Day an alcohol-free event, helping Greek organizations turn off-campus social functions from "keg events" to BYO events, sending an annual policy statement (in compliance with the Federal Drug Free School Act) to every new student that states Michigan Tech's policies related to alcohol use and abuse, and establishing a liaison for Counseling Services with residence hall staff to improve awareness of alcohol and substance abuse issues. Although Counseling Services has had more referrals with regard to alcohol and substance abuse, it appears that this is the result of improved reporting and intervention efforts by residence hall staff, Student Affairs, and Counseling Services.

The *Career Center* (Enrollment Management) has been very proactive in developing placement opportunities in a competitive job market and becoming a full service center for all students, not only engineering students [2.6H6]. The success of on-campus placement declined from 90% in 1989 to 55% in 1992, which spurred new placement initiatives, and a renewed placement rate of 93% today. Significant initiatives include:

- out-of-town job fairs in Detroit, Minneapolis, Chicago, and Grand Rapids which yielded job offers, new co-op opportunities, and 44 new campus recruiters;
- an annual Alumni Telethon, which yielded new relationships with 400 companies; and

- new services—evening hours, new seminars, Resume Expert, mock and video interviewing, and a WWW site [<http://www.ucc.mtu.edu>].

However, results of the Student Survey [6.2B3] indicated that one third of the student sample, half of which were juniors and seniors, had not had any interaction with the Career Center. This raises a question whether students are aware of all of the services available to them.

Educational Opportunity, in addition to the numerous initiatives to improve retention discussed in Chapter 4, keeps diversity issues in the forefront of campus life. During the year, it facilitates Black History Month, Martin Luther King Day, the Black Students Association annual retreat, Women's History Month, and Native American Week. For Summer Session, it encourages departments to develop enrichment courses for nontraditional students and is planning Elderhostel programs for 1998.

Residential Services (including *Residence Life*) has improved computer access, programming, lifestyle options, and governance in the residence halls. Each residence hall now has a computer lab and students have direct links to departmental computers from their rooms. Programs on time management, diversity, study, and communication skills are offered, and students can choose to live in International House with an international roommate. Residence hall governance has been enhanced by holding retreats. Dining Services will offer an additional meal plan option in 1997.

Retail Operations enhanced the quality of service at University Images (formerly the Pro Shop) and established the Tech Express card, a one-stop services and debit card which can be used for meals, vending machines, and building access.

Athletics and Physical Education have made many improvements to the facilities and programs available to students and student athletes; this includes programs to increase student awareness about and involvement in athletics. The University supports [intramural competition](#) in over 38 activities, from archery and racquetball to golf and pickleball, providing a base for lifelong wellness. Student participation (27% of all students) is good. A wellness course (PE100) has also been introduced. Student participation and attendance at varsity sporting events—ice hockey, football, women's and men's basketball, and women's volleyball—play an important role in student life, and school spirit has been enhanced by regional conference championships and individual awards in basketball and volleyball. A significant benefit for student athletes is Individual Athletics (PE110), introduced in 1991 for all freshman varsity athletes, to help them adjust to the demands of both their sport and college

life. Topics covered include time management, study skills, stress management, nutrition, motivation, sports psychology, and academic assistance on campus. Since 1994, the collective GPA for student athletes has increased to surpass the all-campus GPA, a very positive accomplishment.

Student Life



Students have many opportunities to become involved in campus life. Student organizations advertise widely through [The Lode](#) and [Daily Bull](#) (student newspapers), a campus-wide electronic display system ([EDS](#)), publicity in the residence halls and the MUB, orientation mailings, and organizational WWW pages. Student life offerings during new student orientation have increased since 1994. The Student Survey [6.2B3] suggests that student involvement in student organizations provides good opportunities for students to develop leadership, communication, and teamwork skills, and that student life activities help students attain academic success by reducing stress and re-energizing them. However, it also revealed that while some student organizations feel a connection to the Michigan Tech community, others do not.

Cultural Programming is decentralized, as discussed above. Three annual campus holidays centered around student life are K-Day, Winter Carnival, and Spring Fling. Much of the planning and organizing for these events depends on student organizations: Interfraternity Council sponsors K-Day; Blue Key Fraternity sponsors Winter Carnival, an event centered on snow statues, skits, and winter sports teams which over a four-day period brings \$1.5 million into the community annually; and USG sponsors Spring Fling. The Memorial Union Board, the Student Entertainment Board, [University Cultural Enrichment](#), and the Department of Fine Arts all bring cultural events to campus, which provides significant opportunities for student creativity and leadership and expose the campus community to diverse forms of expression.

Examples include:

- the Van Evera Distinguished Lecture series, which has brought Noam Chomsky, Vine DeLoria, Stephen Jay Gould, Yitzhak Rabin, and Howard Zinn to campus in recent years;
- the Bosch Endowment, which recently brought Kurt Vonnegut to campus;
- student performance groups such as the [Troupe](#), an improvisational student acting company, and the Echoes From Heaven Gospel Choir, founded by the Black Student Association in 1990, led by Fine Arts faculty. They not only provide cultural enrichment to our campus, they have also toured throughout the midwest and the choir has toured nationally and internationally; and

- the AIDS quilt, on campus in 1995.

Student Governance takes place in the [USG](#), in residence halls, and in other opportunities for shared involvement in decision making (see "[Integrity](#)", below). USG representatives are elected annually and Residence Life has its own system of governance. USG has been instrumental in advising Student Affairs in the development of various policies and procedures and vocal in University Senate meetings. Students are also involved in University and departmental governance through advisory councils and participation in various committees. Student surveys and student newspapers suggest that the institution has not always involved students in the decision making process. Recent years have seen some improvement in the quality of student involvement: students have participated in University Senate Committees, searches for new faculty and staff, restructuring the student discipline system, and the development of the academic integrity policy. They have also been solicited for feedback by departments.

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Continuous Improvement

We are good at initiating student life programs; we need to become better at evaluating them. Staff and student surveys and departmental self studies reveal that many departments are just beginning to consider student life outside academic work as educationally important, and student knowledge of services and opportunities for the improvement of student life is incomplete.

Our ability to evaluate the quality of student life at Michigan Tech from an assessment and planning perspective is limited by two factors. First, *outcomes assessment* is relatively new, particularly to student services and student life before 1991. A few external and internal surveys on student satisfaction have been conducted and some initial assessment planning done, but the overall effectiveness and quality of student services has not been measured. This effectiveness may be as important to measure as the number of students who use the service. With respect to student organizations, little is known about the quality of these experiences or even student-participation rates. While many student organizations and professional associations exist on campus, participation is often low. Anecdotal evidence suggests a few students do most of the work in many organizations, and turnover hinders organizational memory. Applying outcomes assessment to student services and student organizations will help Michigan Tech enhance the quality of student life and develop student leaders.

Second, future planning for student services and student life programming is not clearly linked to survey results. The link between academic success and learning from experiences outside the classroom, well documented in the higher education literature, [1] is not clearly articulated at Michigan Tech. Some units view themselves as primarily customer service agents, whereas a more holistic view of the student's academic and extracurricular development would enhance educational effectiveness. The strategic planning process has encouraged student services departments to begin thinking about their relationship to University goals and to build stronger links to the strategic plan. The next step is to link planning to University assessment activities. We can take advantage of the Council for the Advancement of Standards (CAS) program to help units assess the quality of their service

and assist in evaluating the relationship between programmatic initiatives and University goals. This quality-focused organization serves as an effective benchmark for student services programs around the country.

Funding of student services and student life has improved, yet remains lean. Students spend a considerable amount of time fundraising to support their organizational activities [6.2B3], which is commendable, but detracts from their academic efforts, and time for organizational activities. Student leaders also report that financial and facilities' constraints minimize what these organizations can accomplish. The maturing partnership between student services and University Advancement should help with funding of student life initiatives. This will be particularly important for initiatives like LeaderShape to continue.

Although students are more involved in decision making today (see "[Integrity](#)" below), students continue to call for more student involvement in University planning and decision making. Including students on TQE teams to improve the quality of student services is recommended. Also, student government could open a student debate on the kind of student life they would like to have. If the main goal of the students is to acquire a degree with as little cost to themselves as possible—even at the expense of a better quality of life—then current funding may be acceptable. But a debate, coupled by a vote on new fees linked to more student decision making, could help the University achieve its stated goals for students.

An opportunity exists to encourage student teams—a University goal—to coordinate programs and generate ideas about resources for more student-led activities. Students want more weekend programs, but the student services staff is insufficient to provide it. An excellent example of student-led student life on campus is Winter Carnival, in which almost no staff or faculty participate in planning. A coordinator to manage the wide array of student activities sponsored by various campus units would increase the quality of programming and allocation of limited resources.

Integrity



Michigan Tech is committed to an educational environment that supports the free exchange of ideas and advances the quality of student life. Since 1988 we have developed new policies, procedures, and informational literature which define and safeguard student rights and responsibilities. A revised Student Code of Conduct and a new Academic Integrity Policy guarantee students due process in integrity issues.

Academic Freedom

As an institution of higher education, the University guarantees the right of academic freedom to both faculty and students. This is clearly stated in the *Student Handbook* [1.2C] and in the Board of Control Manual [1.1, Policy 16.2.2]. Students have every opportunity to engage faculty in discussions over course content without repudiation. Students describe a collegiate environment where faculty invite student commentary.

Student Code of Conduct



In 1994/95, student leaders, Student Affairs staff, and University counsel substantially revised the [Student Code of Conduct](#), entitled "Student Rights and Responsibilities in the University Community" [1.5C3], to clarify University regulations, particularly the judicial processes, for students. This document emphasizes the educational potential of the judicial process and is distributed at orientation to all incoming students.

Academic Integrity



Prompted by concerns about the existing cheating policy as well as a desire to minimize litigation, in 1995 students, faculty, and staff developed and implemented a new [Academic Integrity Policy](#) with clearly stated definitions of cheating, plagiarism, inappropriate citation, and unauthorized study aids. Students charged with academic dishonesty are afforded the same due process rights as other students charged with non-academic integrity violations. Students and faculty have expressed satisfaction with how academic dishonesty is now being addressed on campus under the new policy. Students who see others cheat now have a way to lodge a complaint. Students charged with academic dishonesty, and faculty involved in adjudication, both find the hearing process, particularly the "third-party" review, to be fair.

NCAA Compliance



Athletics has designated a staff person as a compliance officer to manage responsibilities relevant to NCAA regulations. In addition, each coach is required to take a Coaches Certification Test each year to determine whether the coach remains in compliance and is eligible to recruit student athletes the following year. All coaches have passed this test. Plans to install compliance-assistance software to monitor issues such as eligibility and financial aid will increase coaches' efficiency at NCAA compliance. The President of the University is also actively involved: he attends NCAA national conventions and supports a position in the Athletic

Department to provide oversight on compliance regulations.

Diversity



All student organizations' constitutions include a membership clause that affirms membership shall not be impeded on the basis of race, religion, color, national origin, age, sex, sexual orientation, height, weight, and/or marital status. Membership cannot be denied on a basis of disability or veteran status. Currently, student organizations are not monitored for multiethnic/gender inclusion to ascertain how diverse they are.

Student Involvement in Decision Making




Student involvement in University decision making today reflects the belief of the University administration that better decisions about matters that directly affect the lives of students are made when students have input into the decision making process. It also provides accountability to those most likely to challenge policies and decisions. Michigan Tech's commitment to involve students in decision making is reflected in the broad array of committees and boards on which students serve, such as Goal Committees for the University Self-Study, the University Senate (USG representative) and its committees, Student Affairs committees, Career Center and Athletics advisory boards, the Judicial Advisory Board (Student Code of Conduct), Health Services Committee, Computer Advisory Committee, and Campus Safety Committee. Nonetheless, student leaders believe their input needs to be solicited more often.

Students have also served on search committees and performance review committees in academic units. Survey results [6.2B3] suggest that student organization leaders believe they have adequate influence within their own academic department. Even so, a review of departmental self-studies indicates that few have systems for student evaluation of policies and programs; this could lead to policies and procedures which are perceived as unfair or inequitable. We recommend that all departments consider increasing student input into review of departmental decision making and clarify the methods available to faculty and staff for soliciting student input.

Retail Operations and Residential Services have had some difficulty assimilating student involvement in their decision making processes, most recently about MUB operations and housing options. In the latter case, the Executive Vice President and Provost assisted in the resolution of the dispute by chairing a committee composed of student representatives; this demonstrated our commitment to increase student input in University decision making. Because the services of these

units directly impacts the daily lives of students, we recommend that these units adopt procedures to include student leaders in policy development and program review matters, well in advance of proposed implementation. Because the 1988 NCA report specifically cited the need for improved student representation in MUB decision making, we need to make progress here.

Departmental Grievances and Ombudsman

An institution-wide [grievance procedure](#) is outlined in the *Student Handbook* [1.2C]; however, students do not always seem to be aware of the procedure nor the role the Ombudsman can play in helping them resolve a complaint. As a result, students may experience frustration when the problem goes unresolved. We recommend that all departments post the institution-wide procedures outlined in the *Student Handbook* and that Student Affairs inform students at new-student orientation of the grievance procedures. 

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SWOT Analysis

Since 1988, Michigan Tech has increased its attention to the quality of student life. The University has made significant accomplishments in providing services to students. However, until assessment procedures are in place, we will not accurately know how well we are delivering those services and programs. In addition, rapid growth in student services programs and the large number of student organizations requires better coordination of services. Although great strides have been made in including students in decision making processes, continuing inclusion is needed to meet our mission and vision for student life.

In summary, the strengths, weaknesses, opportunities, and threats with regard to student services and student life are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Significant programmatic improvements • Students' leadership capacity • Increased staff • Improved staff competencies • Awareness that life outside the classroom impacts student success 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low student fees which limit funding for student life • Ineffective advising of student organizations • Little coordination of services • Lean staffing • No effective program assessment
	
<p>Opportunities</p> <ul style="list-style-type: none"> • Corporate 	<p>Threats</p> <ul style="list-style-type: none"> • Increased learning

sponsorship of student-life activities

disabilities and substance-abuse among college students

External Assessment of the Environment

Action Plan



To take advantage of opportunities and remedy concerns with regard to student services and student life, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Assess the quality of student services and activities annually for effectiveness in fulfilling University goals and organizing University resources.	<ul style="list-style-type: none">• Vice Provost and Dean for Student Affairs• Student Services Directors• All Academic Departments
2 Develop a financial plan to develop student life objectives.	<ul style="list-style-type: none">• Vice Provost and Dean for Student Affairs
3 Improve the linkage between student services and student academic achievement.	<ul style="list-style-type: none">• Vice Provost and Dean for Student Affairs
4 Coordinate student activities with a calendar of events.	<ul style="list-style-type: none">• Student Affairs
5 Provide more opportunities for student socializing.	<ul style="list-style-type: none">• Student Affairs• All Academic Departments
6 Coordinate student service activities, including academic advising.	<ul style="list-style-type: none">• Student Affairs• Academic Department

Advisors

7 Include student life information in University publications and promotional brochures.

- Admissions
- Student Affairs
- All Academic Units

8 Establish mechanisms and public documentation for better student involvement in decision making, particularly for position searches, use of student fees, and the Memorial Union Board.

- Student Affairs
- Memorial Union Board
- Undergraduate Student Government
- Interfraternity Council
- Inter-Residence Hall Council
- Student Services Directors

This action plan will be integrated into the strategic planning process for 1998/99.

ENDNOTES

1. Boyer, E.L., *College: The Undergraduate Experience in America*, The Carnegie Foundation for the Advancement of Teaching, New York:Harper and Row, 1987, p. 177–199; Pascarella, E.T., and Terenzini, P.T., *How College Affects Students*, San Francisco:Jossey Bass, 1991, pp. 214–334. [BACK](#)

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University Goal 2: Attract, Retain, Support, and Develop Excellent Faculty

The Goal 2 Committee investigated faculty recruitment and hiring, the promotion and tenure process, faculty development, and the faculty reward structure. It evaluated how well these practices and procedures support faculty as they fulfill their roles in teaching, research, governance, and service at Michigan Tech. The outcomes of teaching and research are discussed elsewhere—undergraduate education in [Chapter 3](#), graduate education in [Chapter 7](#), and research in [Chapter 8](#). The Committee also evaluated how well the University is meeting projected targets regarding faculty outlined in the University's Strategic Plan.

This chapter draws primarily on the Goal 2 Committee Report [6.2B4], which drew on documentary evidence as well as a Faculty Survey which it conducted in 1996. A copy of this Faculty Survey and summary results are attached to the Goal 2 Committee Report [6.2B4]; 57% of tenured/tenure-track faculty (197 of the 343), and 33% of non-tenure-track faculty (26 of the 79) responded to the survey. For more detailed information about faculty in particular units, please see [Appendix 6](#), or the departmental self-studies [2.6] available in the Resource Room.

Patterns of Evidence

Purposes



As discussed in Chapters [2](#) and [3](#), Michigan Tech clearly and publicly defines its purposes as excellence in both teaching and research. Although the mission and vision do not explicitly mention faculty, the mission sets expectations for faculty, who conduct most of the teaching and research in the University as well as play major roles in governance and other service activities which help us to achieve our mission. These expectations are also clearly stated to faculty in departmental mission statements and departmental promotion

and tenure criteria, incorporated into departmental charters [3.4]: Excellent teaching is consistently emphasized, balanced by expectations for scholarship and research (which vary with the extent of graduate programs, see Chapters 7 and 8), and supported by service to the department and university. The *Tenured/Tenure-Track Faculty Handbook* (hereafter referred to as the *Faculty Handbook*) outlines roles and responsibilities of faculty in teaching [1.2A, section 3, pp. 12–31].

In President Tompkins' 1991 Expectations [2.1D2], he stated that Michigan Tech should "provide a reward structure that will attract and retain faculty...who support the [University's] expectations." Attracting, retaining, developing and rewarding excellent faculty is a process that takes time as well as clear policies and procedures. Since 1988, policies and procedures have been published in the 1995 *Academic/Research Faculty Hiring Guide* [1.5B1] and the newly revised and updated 1996 *Faculty Handbook* [1.2A]. The new *Faculty Handbook* provides faculty with clear and detailed guidance, and its loose-leaf format allows information to be updated easily. A handbook specifically for non-tenure-track faculty is planned for development in 1997/98.

While the public may clearly understand Michigan Tech's purposes regarding teaching and research, they may not always understand that faculty must balance teaching and research. The University should more actively project the benefits of this balanced faculty role to the public, students, and alumni.

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Resources

Faculty constitute human resources, and they need adequate financial and physical resources to meet University expectations for teaching and research. Financial resources devoted to instruction and research are discussed primarily in Chapters [3](#), [7](#), and [8](#), and physical resources such as facilities and computing are discussed primarily in Chapters [10](#) and [11](#).

The last decade has seen dramatic change in the faculty. Since 1988, we have hired 43% of our current tenured/tenure-track faculty, and the number of tenured/tenure-track faculty have increased by 26%, from 278 to 349. The number of non-tenure-track full-time faculty decreased from 56 in 1988 to 31 in 1996; and part-time faculty decreased from 31 to 23. Faculty satisfaction with Michigan Tech and success at achieving tenure has allowed us to retain most of these new faculty.

Administrative Structure and Human Resources



The faculty is appropriately qualified, well-distributed by rank, and uses peer review in decision making. As outlined in the *Faculty Handbook*, faculty are classified into various categories, including:

1. tenured/tenure-track faculty (responsible for both teaching and research),
2. research faculty (with limited teaching responsibilities), and
3. non-tenure-track faculty (with limited research responsibilities).

In 1995, the University clarified its classification system for tenurable and non-tenure-track faculty, eliminating non-tenure-track Assistant and Associate Professor titles. All Department Chairs, College Deans, Vice Provosts, and the Provost are currently tenured faculty members. Faculty are not represented by a union.

Michigan Tech's faculty is well qualified for its responsibilities in teaching and research, and the quantity and quality of tenured/tenure-track faculty is appropriate to a doctoral institution (see Appendix 2: BID, [Form C](#)). In 1996, Michigan Tech employed 349 tenured/tenure-track faculty. Ninety-one percent of tenured/tenure-track faculty have doctorates, compared to 84% in 1988. Additionally, several faculty have terminal master's degrees in their fields. [Distribution of faculty by department](#) is shown in the *Undergraduate Catalog* [1.3A] and *Graduate School Bulletin*

[1.3B], and discussed in departmental self-studies [2.6]. Faculty transcripts and proofs of degree are on file in the Office of the Provost.

Faculty are well distributed by rank (see Table 11, below). Tenured faculty constitute 75% of tenurable faculty, compared to 56% at research universities nationally. [\[1\]](#)

TABLE 11. Tenured/Tenure-Track Faculty—By Rank and Gender.

Faculty Rank	1988				1996			
	Male	Female	Total	Rank %	Male	Female	Total	Rank %
Full Professor	62	3	65	23%	103	9	112	32%
Associate	104	19	123	44%	124	30	154	44%
Assistant	77	13	90	33%	62	21	83	24%
Total	243	35	278	100%	289	60	349	100%

Source: Institutional Analysis (Fall Headcount)

Academic administration is decentralized and uses peer review. After the Provost authorizes a faculty position, decisions about faculty appointments, promotion and tenure, merit pay, and development are made at the department level. Departmental charters [3.4] outline appropriate procedures, which vary somewhat by department, but all involve peer review. College and School Deans and committees provide a second level of peer review for appointments, promotion and tenure, and final decisions are made by the Board of Control. Department Chairs make decisions about merit pay and faculty development.

Hiring



Michigan Tech is succeeding in attracting excellent new faculty. We have hired 170 new faculty since 1988, 151 of whom remain at Michigan Tech. As a result, we now enjoy a relatively new faculty—43% of the current faculty have been appointed since 1988. Departmental self-studies report satisfaction with new appointments and no problems finding qualified candidates. The Faculty Survey corroborates this satisfaction and quality: 59% of respondents report at least one job offer in addition to ours, and 27% had more than three offers.

Since 1993, faculty appointments have become part of the strategic planning process. Funding for new faculty is strategically allocated to support program needs or other University goals, such as attaining AACSB accreditation for the School of Business and Economics. Until this year, each department competed with others for positions through the realignment process (discussed in Chapter 1, Response to [Concern 3](#)). In July 1997, a pilot position control program was implemented; vacant positions revert to the

Provost, and are dealt with on a case-by-case basis.

The University has clarified policies and procedures to guide searches for new faculty positions. In 1991, the Affirmative Action Office published a [Hiring Guide](#) [1.5B2], which provides information on forming search committees, advertising, and interviewing. In 1995, the Office of the Provost published the *Academic/Research Faculty Hiring Guide* [1.5B1], which outlines a hiring procedure and provides model letters of tender. Most departmental charters now include search procedures for new faculty, including department chairs. National searches are conducted for new tenure-track faculty positions, and search committees with diverse memberships are formed to provide multiple opportunities for faculty input into the hiring process. Departments advertise in discipline-specific media, as well as using innovative electronic media and personal contacts. The Faculty Survey [6.2B4] revealed the importance of personal contacts in the hiring process: 44% of respondents became aware of Michigan Tech through personal contacts vs. 36% through traditional advertisements.

Factors which attract faculty to Michigan Tech are consistent with our educational purposes. The Faculty Survey revealed that the single strongest factor attracting faculty to Michigan Tech was the quality of undergraduate students. The reputation of the University or the department, departmental specialty, and collegial fellow faculty were also strong attractions, suggesting our faculty care about the intellectual climate for learning and scholarship. Our geographical location, with its outdoor recreational activities and small town lifestyle, strongly appeal to faculty who have chosen to come and remain at Michigan Tech, making it a strength for faculty recruitment. Although benefits were also a positive factor, material incentives of salary or start-up funds did not stand out as significant factors attracting faculty to Michigan Tech. This may be because we continue to lag in faculty salaries compared to our benchmark institutions (see "Compensation" below). The Library was in some cases a negative factor in attracting faculty (see [Chapter 10](#)).

Departments report generally adequate start-up funds, which are individually negotiated for each new faculty member. The Research Excellence Fund (REF) and a \$200,000 start-up pool administered by the Vice Provost for Research provide some support for new and junior faculty (see [Chapter 8](#)). Some departments give new faculty release time to prepare courses and get a research program started.

Diversity



Multiple initiatives to appoint more women and underrepresented faculty—a University objective—have led to some success (see Chapter 1, Response to [Concern 2](#)). Since 1988, the number of tenured/tenure-track women faculty grew by 71%, from 33 to 60, which represents an increase from 13% to 17% of the tenurable

faculty. The increase was particularly significant in the engineering faculty, where numbers of women faculty grew from 2 in 1988 to 12 in 1996; this represents a 7% increase in tenured/tenure-track engineering faculty.

During this same period, the numbers of other underrepresented faculty have grown slightly, from 32 to 53, or 12% to 15% of the tenured/tenure-track faculty (see [Chapter 1](#), Table 2). The percentage of underrepresented faculty declines as rank increases, from 19% of Assistant Professors to 11% of Full Professors. Except for Asian Americans, candidate pools for underrepresented faculty in science and engineering remain small.

Michigan Tech has participated in Michigan's King-Chavez-Parks programs for Visiting Scholars to attract underrepresented faculty since 1987/88, and since 1992, the administration has encouraged recruitment of women and underrepresented faculty by providing new faculty positions to departments who recruited qualified candidates (see Chapter 9 for a discussion of University-wide affirmative action initiatives). A concern is our ability to attract dual career couples. Our remote location in a small town presents few job opportunities for spouses, particularly professional spouses. Michigan Tech does not have a spousal hiring policy or a policy for hiring dual career couples, although the [PCW](#) (Presidential Commission for Women) has been working on a policy for several years and the University Senate recommended in 1996 that such a policy be developed. Nonetheless, departments, supported by the administration, have been creative in efforts to hire dual career couples. This has led to a few conflicts (see "[Integrity](#)"). Hiring dual career couples can have a significant impact on our ability to hire more women faculty. Improved child care programs would also help attract and retain faculty with young children. It is recommended that the University adopt recommendations made by the PCW in "Child Care Needs and Implications for MTU" [5.6C].

Promotion and Tenure



Michigan Tech has retained most of the faculty it appoints—83% since 1988—including women faculty. Most achieve tenure; only 20 faculty received terminal contracts or were denied tenure since 1988. There is no evidence that women or individuals from underrepresented groups are failing to obtain tenure or promotion or are resigning at a disproportionate rate [6.2B4]. Structured evaluation processes and faculty development programs help faculty succeed at Michigan Tech (see "[Development](#)" below).

Evaluation and feedback processes are mandated for tenure-track faculty. As outlined in the *Faculty Handbook* [1.2A1], tenure-track faculty receive annual reviews and biennial "major" reviews for reappointment. The tenure review is formalized in the preparation of "Form F" [1.5A2] and accompanying documents. However, the *Faculty Handbook* does not discuss what constitutes a review, and the quality, timeliness, and usefulness of interim reviews vary

across departments. Senior faculty and department chairs do not always provide consistent and timely feedback about expectations and performance appropriate to the individual faculty member. Instituting departmental charters [3.4] in 1996 was one response to this perceived weakness.

Evaluation and feedback are less structured for tenured faculty. Departments maintain current curricula vitae for faculty, and there is an annual curriculum vitae update which documents teaching, research, and service activities. Form F serves for promotion as well as tenure reviews. However, evaluations by department chairs are inconsistently recorded across departments and there is no standard time or criteria for post-tenure review across departments.

Despite these weaknesses, faculty succeed and stay at Michigan Tech, for the same reasons that they were attracted in the first place. Only 7% of Faculty Survey respondents report plans to seek jobs elsewhere.

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Accomplishments

As discussed above, Michigan Tech has been successful in accomplishing its goal of attracting and retaining excellent faculty. Our commitment to undergraduate teaching, graduate education, and research has meant that our moderately sized faculty have had to learn to balance teaching, research, and service, rather than rely on a division of labor in which some faculty concentrate on teaching while others focus on research. Appropriate teaching loads, opportunities for professional development, shared governance, and adequate compensation all support this balance and encourage faculty retention. Michigan Tech is improving in providing professional development opportunities and shared governance, and needs to continue to refine its evaluation and feedback processes for consistency across departments.

Balancing Teaching and Research



Michigan Tech serves the students and the public well by placing its most qualified faculty in the undergraduate classroom. We do not rely heavily on either non-tenure-track faculty, adjunct faculty, or graduate students to teach classes. In 1995/96, tenured/tenure-track faculty taught about 80% of our classes (excluding laboratory sections, which are often taught by graduate students who are supervised by faculty). Laboratory sections involve significant numbers of section credit hours; on a credit-hour basis, tenured/tenure-track faculty teach 66% of total section credit hours.

TABLE 12. Section Credit Hours Taught (000–400 Level) by Rank, 1995/96.

	Course Offering								Total	
	Lecture		Recitation		Laboratory		Research			
Rank	#	%	#	%	#	%	#	%	#	%
Tenured/ Tenure-Track	420	83	4,122	75	652	33	795	80	5,989	66
Instructor/ Lecturer	76	15	693	13	320	16	92	9	1,181	13
Graduate Student	3	1	594	10	889	44	56	6	1,542	17
Other	6	1	130	2	145	7	50	5	331	4
Total	505	100	5,539	100	2,006	100	993	100	9,043	100

Source: Institutional Analysis

This compares favorably to other institutions in Michigan. According to the 1996 State of Michigan Performance Survey, Michigan Tech has the least number of credit hours taught by graduate students among the research/doctoral universities, and among the highest number taught by ranked faculty. At Clarkson, a benchmark institution with fewer graduate programs, tenured/tenure-track faculty teach 62% of undergraduate credit hours.

The average teaching load for tenured/tenure-track faculty at Michigan Tech is 9.8 credit hours per quarter, or 526 student credit hours (credit hours X number of students) per year. This is a significant reduction from 1989 when faculty averaged 673 credit hours annually. Consistent with our commitment to balance between teaching and research, these workloads are generally heavier than many research institutions, but lighter than many teaching institutions. However, teaching workloads are not discussed in most departmental charters, nor are they consistently considered for evaluation purposes. Although the University clearly advocates balance between teaching and research, and the pattern of promotion and tenure decisions under the current administration reveals examples of tenure denial for poor teaching performance and tenure or promotion for excellent teaching, the Faculty Survey revealed that 67% of respondents still believed that research was rewarded more than teaching. One of the ways this perception is being addressed is the recent revision of Form F for tenure and promotion to include more evidence of teaching accomplishment.

Information for evaluating teaching is inadequate. Student evaluations of teaching are required of all faculty, but peer review of teaching is voluntary and inconsistently used. Students appear reasonably satisfied with Michigan Tech faculty, rating them University-wide an average of 4.1 on a 5-point scale. Nonetheless, neither students, faculty, nor administrators find the current evaluation instrument satisfactory. One of the first tasks of the new [CTLFD](#) (Center for Teaching, Learning, and Faculty Development) was to pilot a new instrument for student evaluation of teaching (see [Chapter 3](#) and [2.6F1]) which will provide enhanced feedback based on national norms. The new instrument was endorsed by the University Senate in 1997. The CTLFD will also provide other services to improve teaching performance. Finally, learning outcomes assessment will provide faculty better indicators of student learning that will enable teaching improvement.

Specific faculty accomplishments in undergraduate teaching, graduate education, and research are discussed in [Chapters 3, 7, and 8](#) respectively.

Faculty Development



We are working to integrate and consolidate fragmented activities which foster faculty development. Clear mechanisms for linking assessment, feedback to faculty, and means for improvement, particularly in teaching, have not been available until recently. A thorough study of faculty development at Michigan Tech was conducted in 1995 [5.2A], and recommendations led to several initiatives which supplement existing faculty development activities. The main University-wide mechanisms for faculty development now include:

- *The Center for Teaching, Learning, and Faculty Development.* Established in 1996, with a full-time Director and Assistant Director (see [Chapter 3](#) and [2.6F1]).
- *Orientation Programs.* New faculty orientation programs have improved since 1995. University-wide orientation begins one week before fall classes begin, and some departments also hold orientations. A series of well-attended seminars organized by an *ad hoc* faculty group during 1995/96 addressed teaching, research, and the tenure process. In 1996, the CTLFD assumed responsibility for orientation.
- *Internal Grants.* The Vice Provost for Research reestablished "creativity" grants in 1995, now called Faculty Scholarship Grants (\$70,000 annually), and administers the REF (see [Chapter 8](#) for details on initiatives to develop research). The CTLFD now administers Faculty Development Grants (\$11,000 annually) which support teaching improvement, curricular reform, visits by outside scholars to campus, and other avenues for faculty development. Funding in both programs is inadequate to meet faculty requests and continued improvements need to be made.
- *Sabbatical Leaves.* Although our sabbatical leave policy is adequate and comparable to other research universities [1.2A1], it appears to be underutilized. Only 3%–4% of eligible faculty took sabbaticals in 1990–95, and most took less than a year, citing financial constraints and relocation as impediments. A survey, a task force, and a University Senate committee [5.2B] have all recently addressed this issue, but no action has yet been taken.

Although University-wide initiatives are important to faculty development, the decentralized nature of academic activity suggests that departments should play a key role in faculty development. Mentoring of junior faculty is largely informal, and departmental self-studies rarely mention it. Formal mentoring should be done more consistently by departments, and informal mentoring should be encouraged and rewarded. Departmental self-studies consistently report financial constraints on SS&E (supplies, services, and equipment) budgets for providing travel funds, staff support, and copying; in response, these budgets will increase by an average of 4% in 1997.

Like many institutions, we have not tried to assess how our faculty develop over time, or identified patterns or cycles of growth.

However, despite a commonly expressed concern about senior faculty plateauing or becoming ineffective, departmental self-studies show that senior faculty have played key roles in developing new degree programs and continue to develop new research programs.

Governance



University administration has made a commitment to [shared governance](#) with faculty and staff (see [Chapter 2](#)). Three accomplishments which reflect progress toward shared governance are the new University Senate constitution, positive faculty evaluation of upper administration, and the establishment of departmental charters.

After a two year trial period, in 1997 the [University Senate](#) ratified a new constitution, which was approved by the Board of Control [2.6I3]. Formerly representing primarily faculty, the new Senate represents both faculty and professional staff more equitably. Because each unit has a Senator and alternate, and both serve on at least one Senate committee, 42 tenurable faculty members participate in governance through the Senate. The new constitution provides a clear and detailed list of areas in which the Senate has policy-making advising and advisory power, and outlines the procedures for submitting proposals to the University administration and time limits for response. Procedures for conducting faculty-wide referenda are also outlined, and were utilized several times during the 1996/97 trial period for the new constitution. Communication between faculty, staff, and the administration has improved since the trial period began.

In addition, in 1994, the University Senate passed a policy and procedure for regular faculty evaluation of the upper administration. The first evaluation was completed in 1996. Upper administration received positive ratings from approximately 75% of the faculty, a reversal of the findings in the *1991 Report of the Commission to Evaluate the Upper Administration* [5.3E1] in which 72% of respondents did not believe that upper administration as a whole encouraged dialogue with the faculty and staff, and 75% did not believe that they encouraged open discussion and debate when establishing institutional goals and objectives.

In 1992/93, the University Senate authorized the establishment of departmental charters for every department. The charter is the central document which guides departmental governance, and includes written policies on appointment, promotion, and tenure of faculty; grievances; committee structure and internal governance; and department chairs. Every department now has an approved charter. However, a review of departmental charters reveals that not all departments have policies in all areas of concern to faculty.

Of particular interest for shared governance are procedures in the charters for the selection, appointment, evaluation, and

reappointment of department chairs. Previously, departments had "heads" and faculty involvement in selection was limited to informal solicitation of opinions. Now, departments have "chairs" and faculty are formally involved in the selection process, as well as in evaluation for reappointment. This suggests that chairs are accountable to faculty as well as the administration. The majority of department chairs have been selected under the new procedures, which appear to have a favorable reception from faculty.

Service



Michigan Tech faculty are actively involved in service to the University and their departments, as detailed on their curricula vitae. Both assessment and accreditation have been faculty-driven. In this University Self-Study alone, 44 tenured/tenure-track faculty participated at a significant level. Search committees, task forces, standing committees, and *ad hoc* committees have taken considerable amounts of faculty time over the past decade as a new administrative team and a new faculty have been assembled.

Our faculty are also actively involved in service to their professions. Many faculty contribute to professional organizations as officers or committee members, and serve on professional journal editorial boards. They are also elected to public boards.

Compensation



In the 1996/97 Faculty Salary Survey conducted by Oklahoma State [8.4A], Michigan Tech was behind in compensation by 10% compared to its regional reference group. This is an improvement from 1992/93 when we were 13% behind, and can be attributed to the priority given to faculty salaries in the budget process. University administration tracks faculty salaries by discipline against benchmark institutions, and in 1992/93 it conducted a salary equity study, which found no significant disparities by gender. Periodically funds are targeted to address significant deficiencies.

Michigan Tech's medical benefits are extensive and premiums are fully paid by the University. A flexible benefits plan was instituted in 1996. In 1997, the University offered to increase its contribution to TIAA-CREF retirement accounts with the introduction of a 1% matching program (planned to go to 2% in 1998/99). The University currently contributes 10.55% of salary. Employees who enroll in the matching program and thereby contribute 1% of their salary will receive 11.55% from the University, for a total retirement contribution of 12.55%. The University allocated a 1% salary increase in 1997/98 which employees could elect to use for their contribution. This matching program was designed to replace a retirees health benefits program adopted by the Board of Control in 1992. That plan will be phased out over a ten year period in recognition of the increase in the TIAA-CREF contributions. Michigan Tech also provides a variety of other benefits which

include the newly approved Tuition Reduction Incentive Program (50% tuition reduction for employees' spouses and dependent children).

The merit pay process for all tenurable faculty is clearly defined in the departmental charters. Most departments have explicit statements of merit pay criteria that reflect the mission of teaching and research. However, service is not always adequately considered in decisions about merit pay, teaching load, or promotion. This may be a weakness in an era emphasizing decentralized assessment of learning and participation in strategic planning. Faculty will need realistic teaching loads and rewards for these services.

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Continuous Improvement

Because nearly half of the faculty have been hired during the past decade, when expectations for a balanced program of teaching and research were clearly articulated and research capability was a significant selection criterion, the groundwork for a faculty that can continue to accomplish the University's purposes well into the future has been successfully established. As we improve and learn from our new assessment processes, teaching evaluations, and faculty development programs under the leadership of the new Vice Provost for Instruction and the Director of the CTLFD, we anticipate a strengthened ability to meet our teaching mission. The importance of these internal processes, as well as improved departmental evaluation and feedback, cannot be underestimated. Evidence suggests that a period of faculty expansion has ended, that recently hired faculty will be tenured, and that we therefore cannot depend on future infusions of new faculty to revitalize our teaching and research.

A concern is that the combined demands of new initiatives in undergraduate teaching, expanding graduate programs, a growing research agenda, and increasing service loads required by assessment, involvement in governance and strategic planning, and a possible change to semesters, may outstrip faculty resources. Half of our current faculty are at mid- or late-career, and the new cohort will enter mid-career over the next decade. Mid-career faculty may face plateauing and burnout, yet are probably more able than new faculty to engage in personal development activities which will improve their teaching effectiveness. Faculty in late career are often ready to make a final and significant contribution to research and service [5.2A]. Over the past decade, significant attention has been paid to developing the organizational structure and allocating the resources to support new faculty. The coming decade will require equal attention to developing the structures and allocating the resources to support mid- and late-career faculty.

Systematic and purposeful post-tenure review, improved opportunities for faculty development or utilization of existing opportunities, and a reward structure that recognizes accomplishment could enhance the careers of these faculty, and their contribution to University purposes. These will be a

challenge for the CTLFD and departmental governance structures, because they need to be built on a better set of indicators than we currently enjoy. Moreover, the process needs to be constructive and developmental, not punitive or threatening to the institution of tenure. Holding to high standards in post-tenure as well as pre-tenure review will improve public acceptance of tenure.

Integrity



Michigan Tech demonstrates integrity in its practices and relationships with faculty. As noted above in "[Purposes](#)," after a lengthy period of development, a new version of the *Faculty Handbook* [1.2A1] was published in October 1996, which includes many new or significantly revised policies that contribute to integrity in faculty activities. Significant policies include the following:

1. *Academic Integrity and Honesty*. Expanded, clearer policy with definitions and new, extensive procedures.
2. *Academic Freedom*. Assured by Board of Control Policy. Revisions in process.
3. *Conflict of Interest*. New policy approved by the Board in 1995 represents a significant strengthening of University integrity; procedures are not yet approved.
4. *Scientific Misconduct*. New policy and procedures were established in 1994/95. This is a significant contribution to creating a climate of integrity in a research university.
5. *Statement on Professional Ethics*. Major revision incorporates clearer outline of responsibilities to students, staff, colleagues, and the institution.
6. *Grievance*. New policy and procedures were established in 1995. Previously there were no faculty grievance policies or procedures.
7. *Discrimination/Harassment*.
8. *Promotion and Tenure Policy and Procedures*.
9. *Separation*. Revision will be studied in 1997/98.

There do not appear to be any impediments to freedom of inquiry. Departmental charters, discussed earlier under "Governance," have improved the integrity of search, review, and reward processes by increasing opportunities for faculty participation, broadening decision-making, and assuring consistency of treatment.

There are, however, two concerns regarding integrity with respect to faculty. The first concern involves faculty appointments to tenure-track positions. In the absence of a policy on dual career couples, there have been several instances of appointing spouses of administrators and faculty to tenurable faculty positions without searches, with some

objections from faculty. The President retains the right from the Board of Control to appoint faculty at will, overriding other policies on appointments. This has caused some conflict, including the rejection by upper administration of a University Senate proposal (32-96) to restrict such appointments. Goal 2 Committee recommends that such appointments have the consent of the faculty in the department in which the appointment is made.

A second concern is the disparity between policy in the *Faculty Handbook* [1.2A1] governing annual reviews and promotion and tenure, and actual practice. Fortunately, practice appears better than the policy. The policy does not, for example, clarify how an interim review is to be conducted, by whom, or whether clear written feedback and evaluation must be provided to the faculty being reviewed. Although a written evaluation is required for annual reviews, the mode of feedback varies among academic units: Some provide faculty formal written summaries from department chairs and/or department promotion and tenure committees, while others might orally discuss faculty achievements. Most departments do follow clear, written departmental processes for these reviews. However, inadequate policy has allowed some inadequate performance. A faculty committee is currently working to revise the tenure and promotion policy to clarify procedures and resolve some gaps and contradictions in the policy.



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SWOT Analysis

Michigan Tech has been able to attract and retain excellent faculty over the past decade, positioning us to accomplish our purposes in teaching and research. Organizational structures which ensure faculty development and rewards are in place, but need improvement, particularly to meet the needs of tenured, mid- and late-career faculty over the next decade.

In summary, the strengths, weaknesses, opportunities, and threats with regard to faculty are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • New faculty • Faculty satisfaction with MTU • Excellent attraction and retention • New faculty development initiatives • Improved faculty-administration communication 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Inadequate teaching evaluation • Feedback for tenure-track faculty • Feedback and development for tenured faculty • Compensation below benchmarks • Inadequate library collection
	
<p>Opportunities</p> <ul style="list-style-type: none"> • Oversupply in most academic job markets 	<p>Threats</p> <ul style="list-style-type: none"> • Public misunderstanding about faculty role
External Assessment of the Environment	

Action Plan

To take advantage of opportunities and remedy concerns with regard to faculty, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Establish a standard form for annual review of tenure-track faculty which incorporates meaningful, individual guidance and a plan for the next academic year.	<ul style="list-style-type: none">• Executive Vice President and Provost• University Senate
2 Develop and implement a standard post-tenure planning, evaluation, and feedback process that is consistent across departments and oriented to long-term growth and development.	<ul style="list-style-type: none">• Executive Vice President and Provost• University Senate
3 Develop and implement a better system of teaching evaluation (in progress).	<ul style="list-style-type: none">• Center for Teaching, Learning, and Faculty Development• Vice Provost for Instruction
4 Continue to implement recommendations with regard to faculty development, particularly departmental initiatives and enhanced funding for Faculty Scholarship Grants and Faculty Development Grants.	<ul style="list-style-type: none">• Department Chairs• Executive Vice President and Provost
5 Improve departmental processes for allocating faculty teaching loads.	<ul style="list-style-type: none">• Department Chairs
6 Increase faculty salary to national norms.	<ul style="list-style-type: none">• Executive Vice President and Provost
7 Improve the public understanding of the faculty role in teaching and research.	<ul style="list-style-type: none">• Governmental Relations• University Communications

8 Inform departments of results of Faculty Survey, particularly with respect to strengths in recruiting strategy.

- Center for Teaching, Learning, and Faculty Development

This action plan will be integrated into the strategic planning process for 1998/99.

ENDNOTES

1. Taylor, B.E., Meyerson, J.W., and Massy, W.F., *Strategic Indicators for Higher Education*, Princeton, NJ: Peterson's Guides, 1993. [BACK](#)

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University Goal 3: Strengthen and Develop Graduate Programs

The Goal 3 Committee investigated past, current, and planned University efforts to develop and strengthen graduate programs, and evaluated graduate program growth, graduate school administrative functions, financial aid programs, graduate student quality, graduate student opportunities, and graduate faculty quality. Graduate education is intimately linked to research; however, we will discuss research primarily in [Chapter 8](#).

This chapter draws primarily on the Goal 3 Committee Report [6.2B5], the Office of Research and the Graduate School Self-Study (see [Appendix 6](#)), and the Council of Graduate Schools Consultant Report [2.8F, hereafter called the Consultant Report] which constituted an external review of the Graduate School. This chapter thus focuses broadly on overall Graduate School goals and accomplishments. For more detailed information about graduate programs in particular Colleges and Schools, (see [Appendix 6](#)), or the departmental self-studies [2.6] available in the Resource Room.

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At the graduate level and in research, we will focus especially on growth in interdisciplinary approaches in areas of established strength and future need. Consistent with the increasing complexity of science and technology, we will substantially increase the proportion of graduate students. (University Vision Statement).

Michigan Tech clearly defines its mission as quality education in engineering, science, and related fields, and more specifically describes the process and product of graduate education in its vision statement. The Graduate School's

mission, published in the [Graduate School Bulletin, 1996–98](#) [1.3B], is consistent with the University's mission and vision to be a nationally and internationally recognized leader in graduate education and research, and to apply knowledge to better society. A vision statement for the Graduate School has been developed. In 1996/97 we enrolled 353 full-time masters students in 20 master's programs and 275 full-time doctoral students in 15 doctoral programs, and granted 164 master's and 50 doctorates (see BIDs, [Appendix 2](#) for breakdown by program). Nearly all graduate students are full-time on-campus students.

The University Strategic Plan [2.1D2] includes two clearly stated subgoals for graduate programs, each with multiple objectives:

1. enhance graduate student enrollments and recruit high quality graduate students and
2. strengthen the graduate program.

Many benchmark institutions have comparable missions for graduate education, which suggests that our mission is appropriate for an institution of higher education. The Consultant Report [2.8F] considered this mission very realistic. The missions of the College of Engineering, College of Sciences and Arts, and School of Forestry and Wood Products also discuss graduate programs (see Appendix 6), and college, school, and departmental self-studies [2.6] report activities which are consistent with the mission and goals of the Graduate School.

However, the Graduate School mission does not specifically address the University's scientific and technological emphasis or the importance of interdisciplinary activities, which is also an objective under subgoal 2 in the Strategic Plan. Moreover, given our growing graduate programs and plan to enhance enrollment, a third subgoal to provide an environment which enhances the quality of graduate student life (comparable to Goal 1.3 for undergraduate education) seems appropriate. The Graduate School mission is not reviewed or assessed as part of the strategic planning process, and it is recommended that the Graduate School mission be revised to incorporate these areas of importance to the University.

Graduate students are kept informed about the purposes of the Graduate School through biannual *Bulletins* [1.3B]; a newsletter, *Out of the Blue* [7.4C]; and a [WWW](#) page. The [Student Handbook](#) [1.2C] applies to graduate students as well as undergraduates, and an additional publication, *Keeping on Track in Graduate School* [7.4C], specifically outlines procedures for attaining graduate degrees.

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Resources

The University has effectively organized its human, financial, and physical resources to deliver a quality graduate education. The Graduate School is efficiently linked to central administration, academic departments, and graduate students through a Graduate Council and a Graduate Student Council (GSC). [Graduate faculty](#) are appointed and retained subject to clear policies. During the past decade, the quality and quantity of resources available to graduate students has improved significantly. Although the Graduate School as a whole has received an external review [2.8F], the University conducts no systematic, periodic review of all graduate programs. Recruitment and retention of graduate students would benefit from more centralized planning. One concern is that the majority of engineering graduate students are recruited internally from Michigan Tech. Office space and computing are inadequate in some departments.



Administrative Structure

Responsibility for graduate programs rests with the Vice Provost for Research and Dean of the Graduate School, who reports to the Executive Vice President and Provost. The title of Vice Provost was added in 1991. Because this chapter focuses on the Graduate School, we will refer to the senior administrator as its Dean. The current Dean has held this position since 1988; he was judged an effective and highly qualified administrator by the Consultant Report [2.8F] and recently was elected chair of the Midwestern Association of Graduate Schools for 1997. The [Office of the Graduate School](#) now has an efficient and effective staff of four, two of whom were added since 1988 to work with departmental program coordinators and track graduate financial support (see [Figure 17](#), Chapter 8). Internal and external evaluations of staff have been uniformly positive.

The University supports several mechanisms to create effective links and information flows between central administration and individual departments. The Dean is advised by a Graduate Council, composed primarily of faculty, and the GSC. The Graduate Council, which was a small, elected body until 1993, is now a representative body with one faculty member from each of the 17 graduate degree-granting units, plus a voting representative each from the University Senate and the GSC. This restructuring facilitates the flow of information between central administration and the academic departments. The Council has taken an active role in policy-making, such as assisting in developing a method for allocating graduate assistantships in 1993.

The GSC, initially established in 1975 [3.7B], was reactivated in 1989 to become an active voice in graduate student life and planning. It was restructured in 1990 to include a representative from each department offering a graduate program, and four standing committees—academic, social, networking, and benefits. With an annual budget of \$10,000 (in 1996/97 it was allocated an additional \$10,000), it funds travel to professional meetings to deliver scholarly papers, a seminar series of external speakers, an information exchange, a newsletter, and social events. All graduate students are welcome to attend its meetings and bring issues to the GSC.

Graduate education is delivered by, and depends upon the quality of graduate faculty. The Dean appoints graduate faculty following procedures and adhering to qualifications established in the *Faculty Handbook* [1.2A]. Three qualifications include:

1. a terminal degree in the field;
2. a regular publication record of articles in recognized journals that have national distribution or books related to their field of study; and
3. a record of involvement in research, graduate instruction, or graduate-student advising.

Currently 90% of the faculty have graduate faculty status; graduate faculty status is subject to periodic review by academic administration. Michigan Tech's graduate faculty are professionally active and productive (see [Chapter 6](#)), which contributes to high-quality graduate programs. Most of the new faculty hired since 1988 (see [Chapter 6](#)) qualify as graduate faculty and were sought for their ability to direct graduate students and attract research funding (see [Chapter 8](#)), particularly for graduate assistantships. Over 70% of faculty responding to the 1996 Faculty Survey [6.2B4; N = 179] described their involvement with their departmental graduate program as active, and were satisfied with this.

Graduate programs are approved, following appropriate policies and procedures, by the Graduate School, the University Senate, the Board of Control, and the Academic Affairs Officers' Committee, which includes Michigan's 15 public universities' Provosts/Vice Presidents of Academic Affairs. Faculty, College and School Deans, the Dean of the Graduate School, the Executive Vice President and Provost, the President, and the Board of Control all evaluate program proposals, as do the Graduate Council, and the University Senate. Once approved and implemented, however, no consistent, centrally administered process exists for the periodic review of graduate programs. Two programs have invited external reviews since 1988: Rhetoric and Technical Communication [6.6A] and Forestry.

In addition to these administrative bodies, the Graduate School produces two useful documents to keep students, faculty, and departmental administrators informed of university and departmental requirements: the [Graduate School Bulletin](#) [1.3B] and *Keeping on Track in Graduate School* [7.4C]. Individual departments also publish departmental handbooks (Humanities) and newsletters

(Computer Science) to inform faculty and students about current research projects and grants. The GSC published *The Call of the Keweenaw* [7.4C], an informal guide to on- and off-campus issues for graduate students.

Overall, the Graduate School is strongly led and staffed by efficient and friendly personnel and maintains good linkages with departments, providing means for the discussion, dissemination, and implementation of policies on graduate education.



Recruitment and Retention of Graduate Students

Some graduate programs support many recruitment activities, but the Graduate School does not coordinate any campus-wide recruitment efforts. The Graduate School maintains a [WWW](#) site to aid with recruitment and admissions, has participated in some recruitment fairs, and works with international programs to recruit international students. To assist Enrollment Management with graduate recruitment, the Graduate School developed a brochure, *Avenues for Research* [7.4C], to publicize graduate offerings. The University makes specific efforts to recruit underrepresented students (an area recommended for improvement by 1988 NCA Evaluation Team [6.1A]) through involvement in the King-Chavez-Parks Future Faculty Program, partnership with historically black colleges such as Florida A&M, and the National Consortium for Graduate Degrees for Minorities in Engineering and Science [2.6F2], which provides fellowships for masters programs in engineering and doctoral programs in engineering and science. However, recruitment is primarily the responsibility of individual departments, whose departmental self-studies [2.6] reveal a range of initiatives: printed brochures, advertising in leading journals, socials at professional conferences, WWW pages, alumni networking, and campus workshops.

A particular concern is that we continue to draw heavily on Michigan Tech undergraduates, particularly in engineering, to expand the graduate programs. From 1993 to 1996, 55%-66% of Engineering MS graduates received their BS at Michigan Tech, while over 70% of MS and PhD graduates from non-engineering departments were recruited from other institutions [6.2B5, Attachment F]. The Consultant Report [2.8F] noted that many departments are not engaging in proactive recruitment and thus may not be attracting as many qualified applicants as they could. As a result, the Consultant Report recommended several actions for the Graduate School to improve recruitment:

- offer a recruitment training seminar to all graduate departments;
- designate a graduate recruitment coordinator, who is accountable for recruitment productivity, for each graduate program; and
- establish a Graduate School matching fund to help departments develop recruitment materials and implement recruitment

strategies.

A weakness which may affect recruitment is delayed notification of graduate teaching assistantships and fellowships, which significantly influences student choice of graduate programs [2.6B6].

Retention efforts include graduate-student orientation programs on teaching, research, safety issues, and communication skills, provided both by departments and centrally by the [CTLFD](#) (Center for Teaching, Learning, and Faculty Development). The Graduate School has paid half the registration fee for all graduate students wishing to attend the on-campus Midwest Faculty Forum, which is dedicated to teaching issues. Special attention is paid to ESL (English as a Second Language) programming for foreign-national teaching assistants, provided by CTLFD. The GSC publication, *Call of the Keweenaw* [7.4C] also assists with retention by providing useful tips on university services, housing, and community resources, as does a graduate student mentoring program initiated in 1995.

The Consultant Report noted that there can be substantial differences in workload expectations for Graduate Research Assistants (GRAs) and TAs (Teaching Assistants) in different departments. Although GRA/TAs are limited to 20 hours of work per week, the work required to complete their tasks may exceed this limit. This may impact retention, as well as time-to-degree completion.



Financial Resources

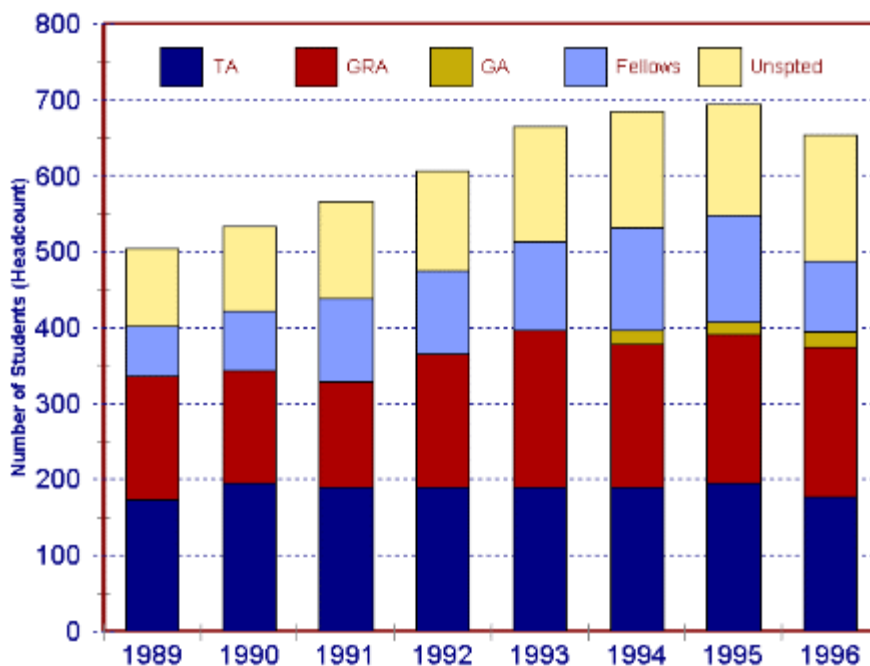
A significant contributor to graduate student retention is financial assistance. We expend over \$5 million per year to support nearly 80% of our graduate students. Graduate student financial assistance is provided through funded appointments.

- Teaching Assistantships (TAs) are allocated by the Office of the Provost and academic departments, dependent upon undergraduate enrollment.
- Graduate Assistantships (GAs) are allocated by the Graduate School to develop departmental graduate programs.
- Graduate Research Assistantships (GRAs) are awarded by the professor or department administering a specific research grant or contract.
- Graduate School Fellowships and University PhD Fellowships (nine month full support for PhD students) are allocated by the Graduate School.
- Other fellowships, such as Exchange Fellowships and industry-sponsored fellowships, support some graduate students.

These appointments carry with them full tuition and a stipend. Annual graduate student stipends are currently competitive with other benchmark schools at \$7,800 for MS students and \$9,060 for PhD students [2.6F6], although one department (Chemistry) considers them below average for its discipline. GRAs/TAs also receive \$100 toward their health benefit premiums.

The percentage of students supported has remained relatively constant at 70%-80% since 1989. As enrollment grows (see Figure 13), the number of students supported grows. In particular, University PhD Fellowships doubled from 9 in 1987 to 22 in 1996

FIGURE 13. Graduate Student Financial Support.



Source: Graduate School (Fall Headcount)

In the face of tight State funding, the University is limited as to how much internal support it can provide for graduate programs. Support-to-date has been critical in developing new programs, but external funding captured by a broad range of faculty through research programs and other grants is necessary to expand graduate programs. Research efforts will be discussed in [Chapter 8](#).



Physical Resources

Since there is no central organization of resources for graduate students, the quality and quantity of space (classroom, office, and laboratory), laboratory equipment, and computer facilities for graduate students varies from department to department [2.6F6, 6.2B8, 6.2B9]. In 1992, the Graduate School secured space for and remodeled the Graduate Student Center, which is used for GSC meetings, thesis and dissertation defenses, seminars, and informal gatherings.

Growth in research funding and new buildings have increased quality and quantity of laboratory space and equipment. Some departments have a separate computing laboratory for graduate students. Space for graduate student offices remains a problem in some departments [2.8C]. Classroom space has been converted into graduate student offices, although this is not always ideal, and phone service is inadequate. Some of these problems will be alleviated when several

new facilities are completed (see [Chapter 11](#)).

The Library continues to be cited as a problem for some graduate students (see [Chapter 10](#)). In the 1996 Graduate Student Opinion Survey [2.8C], 39% of the 150 respondents stated they were "Not at all satisfied" with library/research facilities. The library is working hard to develop on-line and interlibrary loan delivery services, and, as the WWW continues to grow, this problem may diminish.

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[Self-Study Report](#)**7****Graduate Education**[ACRONYM Help](#)[Chapter Contents](#)[University Goal 3: Strengthen and Develop Graduate Programs](#)[Patterns of Evidence](#)[Purposes](#)[Resources](#)[Accomplishments](#)[Continuous Improvement](#)[Integrity](#)[SWOT Analysis](#)[Action Plan](#)

Accomplishments

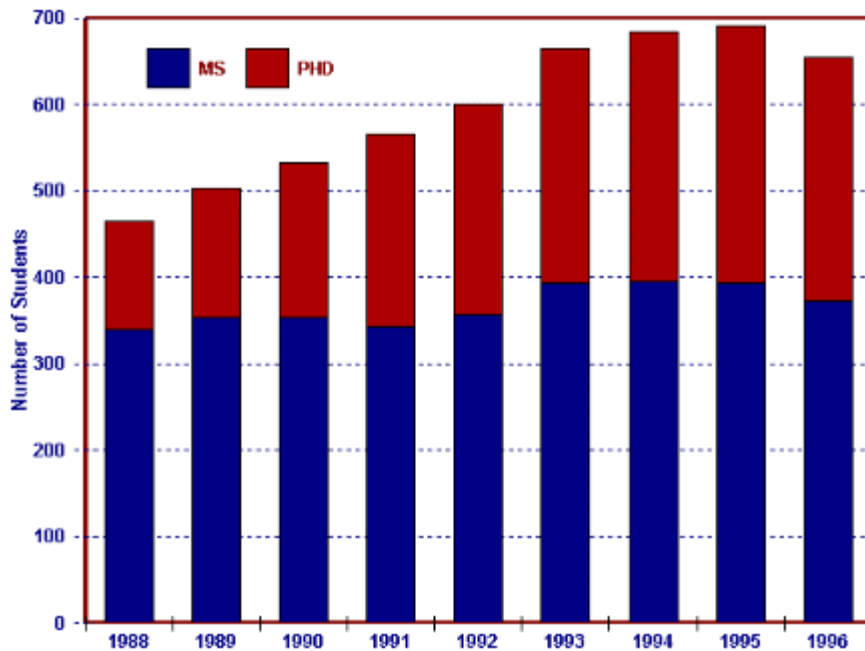
The University is accomplishing its stated purposes for graduate education. Over the past decade, graduate enrollment increased substantially and steadily until 1996, primarily in doctoral programs. Nonetheless, we have not reached our ambitious enrollment goals. Most programs are well-focused along traditional discipline lines and are coherent within a particular discipline or specialty. Innovative interdepartmental and interdisciplinary programs have developed which are more individualized and flexible. Outcomes assessment is in the early stages of implementation. While the University is well known for its large baccalaureate engineering programs, it is not yet well known for its emerging graduate programs. Nevertheless, there are indications that several of our graduate programs are being externally recognized as high-quality programs.



Enrollment

Since 1993, graduate students have represented approximately 10% of the total student body, up from 7% in 1988. While undergraduate enrollment declined after 1992, graduate enrollment continued to grow steadily to 691 in 1995, then declined to 654 in 1996, a 41% increase from 1988 (see Figure 14). Over 95% of graduate students are full-time. [1] Consistent with NCA's 1988 recommendations, and with our plans to achieve Carnegie Doctoral I status, we have emphasized doctoral programs, more than doubling enrollment in PhD programs since 1988 to 281. Enrollment in masters programs has increased by 10% to 373. Doctoral students now represent 43% of the graduate enrollment, compared to only 27% in 1988, just short of the planned target of 50% by 1998.

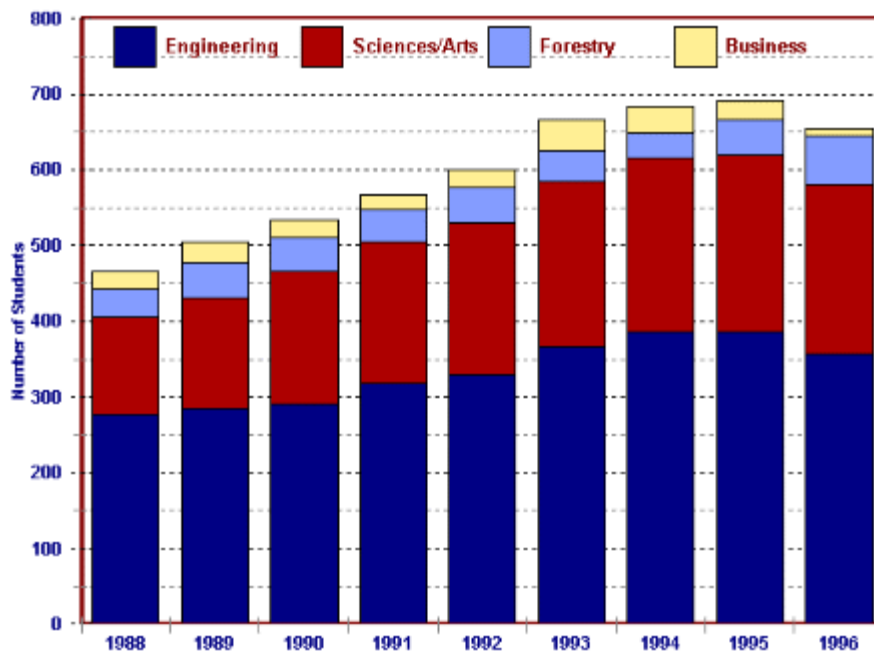
FIGURE 14. Graduate Student Enrollment.



Source: Institutional Analysis (Fall Headcount)

Consistent with our mission in engineering and science, over 85% of graduate enrollment is in engineering and science, including over 41% at the PhD level (see Figure 15).

FIGURE 15. Graduate Student Enrollment by College and School.



Source: Institutional Analysis (Fall Headcount)

Nonetheless, ambitious enrollment projections made in 1991 to achieve 500 MS students and 400 PhD students by 1998 [2.1C], and again in the Strategic Plan [2.1D2, Quantitative Context] to achieve 800-1,000 graduate students, may not be realized. Factors which may contribute to this are a strong job market in engineering which

discourages full-time graduate study and a trend toward less traditional programs. Also, we canceled the MS in Operations Management, which enrolled 27 students in 1994, in order to pursue accreditation for undergraduate programs in the School of Business and Economics.

Concern was expressed by the 1988 NCA Evaluation Team about enrollment of underrepresented groups. In 1996, 33% of all graduate students were women—25% in Engineering (up from 10% in 1988) and 40%–46% in other Colleges and Schools. Involvement in the King-Chavez-Parks Future Faculty Program has increased our underrepresented graduate student enrollment from none in 1988 to ten today. One GEM (Groundwater Education in Michigan) fellow is also enrolled in Metallurgical Engineering. Given the fact that graduate programs must recruit aggressively for good students, recruitment efforts specifically designed to attract students from underrepresented groups are especially urgent.

Coherence and Rigor in Graduate Programs



Our graduate degree programs are well-focused along traditional disciplinary lines. Many have been established since the last NCA review in 1988, including:

- PhD programs in Chemical Engineering, [Civil Engineering](#), [Electrical Engineering](#), [Mining Engineering](#), [Geological Engineering](#), and [Mathematical Sciences](#), and
- MS programs in [Industrial Archaeology](#) (Social Sciences) and [Environmental Engineering](#).

To meet student interest in less traditional and more interdisciplinary studies, since 1988 we have also developed innovative graduate programs such as the PhD in [Rhetoric and Technical Communication](#); the non-departmental PhD in Engineering with a specialization in Computational Science and Engineering; MS in [Environmental Policy](#) (Social Sciences); and international MS options in [Forestry](#) and [Civil Engineering](#) in cooperation with the Peace Corps.

Rigor and coherence of the graduate programs are demonstrated by [admissions standards](#), required GPA, and examination and thesis or dissertation requirements. The first test of rigor is admissions standards. The Graduate School has published minimum standards (2.7 GPA) and individual departments set additional standards, such as GRE and GMAT scores. After entering the program, a minimum GPA of 3.0 is required to remain in good academic standing. Rigor is balanced by flexibility in the curriculum, which allows departments to build a coherent program through a balance of coursework and practical experience. This flexibility is especially important for students entering graduate school with previous work experience or an interest in interdisciplinary research, and facilitates the growth of newer, innovative programs. Thus, while some departments require core courses (e.g., Electrical Engineering, Mechanical Engineering/Engineering Mechanics, Computer Science, and

Humanities) other departments configure coursework requirements for each student (e.g., Physics, Biological Sciences, Civil and Environmental Engineering, and Chemical Engineering). Some programs specifically require or encourage interdisciplinary coursework (e.g., Mathematical Sciences and Humanities) and some require internships (Mathematical Sciences and Social Sciences).

With respect to coursework, graduate courses are clearly distinguished from undergraduate course offerings by course number (i.e., 500- or 600-level). 500-level courses are, however, open to qualified senior students, while 600-level courses are restricted to graduate students. An examination of recent course enrollments [6.2B5, Attachment D] shows that the overwhelming majority of students taking 500-level and 600-level courses are MS and PhD candidates, respectively. Graduate students are also permitted to take 400-level courses (and 300-level in non-cognate areas), intended for upper division undergraduates, for graduate credit. A concern expressed in the Consultant Report [2.8F] was the limited number of graduate courses in some departments, which was considered problematic for the graduate students who received undergraduate degrees from Michigan Tech.

The emphasis on individualized program planning combined with University requirements for the presentation and defense of projects, theses, and dissertations provides a rigorous but flexible graduate program sensitive to the needs of a changing student population.

Assessment



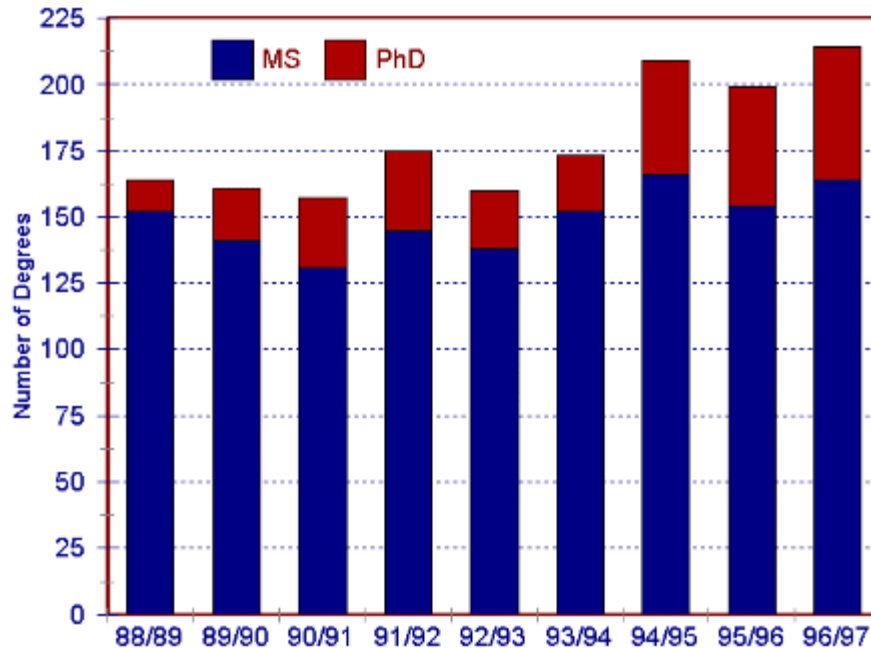
The standard measure of graduate student achievement has been the quality of masters theses and projects, and doctoral comprehensive examinations and dissertations. Some departments also have expectations regarding graduate student publication and conference presentations (e.g., Mechanical Engineering/Engineering Mechanics and Physics). These measures are undergoing thorough review, revision, and formalization as part of the assessment process. All departments now have assessment plans which they began to implement in 1997.

Departmental assessment plans consistently emphasize acquisition and presentation of disciplinary knowledge, either written or oral (e.g., Chemistry and Mechanical Engineering/Engineering Mechanics), and skills for life-long learning. This emphasis fulfills the University's legislated mission to prepare graduates for industry. Assessment of the acquisition of broader goals at the graduate level, which reflect the University's vision for meeting the changing needs of a global, technological, diverse, and environmentally sensitive society, or for interdisciplinary approaches, is often not discussed in departmental self-studies or assessment plans, or if discussed, there are no plans for measurement. However, specific programs meet many of these goals (e.g. MS program in Environmental Policy, International MS in Forestry, and interdisciplinary non-departmental PhD in Engineering).

Graduation, Time-to-Degree, and Placement

The number of graduate degrees awarded annually by the University has increased substantially from 164 in 1988/89 to 214 in 1996/97, a 30% increase (see Figure 16). Awarding of doctoral degrees has more than tripled, to 50. This has allowed Michigan Tech to attain Carnegie Doctoral II status in 1995 and surpass the threshold requirement for Doctoral I in 1996. Sixty-three percent of the MS degrees and 54% of PhDs were awarded in engineering, consistent with enrollment rates, and with our mission.

FIGURE 16. Graduate Degrees Granted.



Source: Institutional Analysis (Fiscal Year by Conferral Date)

Although this growth in graduate programs is significant, it is not yet sufficient to attract national recognition in any rankings comparable to our recognition for engineering baccalaureate programs. At the graduate level, program recognition is also influenced by career success of program graduates, professional success of faculty, and funding for graduate research, especially in the form of national research centers. Data is not complete, but PhD graduates whose whereabouts are known (78% of 1995 and 60% of 1996 classes) have full time employment pertinent to their degrees. Many have accepted faculty positions at universities such as Washington State, University of Idaho, University of Arkansas, University of Akron, Villanova, Clemson, Clarkson, Purdue, and Texas Tech. Others have secured positions at national laboratories and in industry.

International recognition is evidenced by our international graduate student exchange agreements [1.3B] with the University of Sonora (Mexico), the Swiss Federal Technical Institute, Pohang University of Science and Technology (Korea), Korea Advanced Institute of Science and Technology (KAIST), and University of Southampton

(UK). Several Royal Thai Scholars are already in attendance, and International Programs is working to increase the number of externally funded graduate students. It is currently in active discussions with potential partners in Turkey, Saudi Arabia, United Arab Emirates, Kuwait, Turkey, and Indonesia. In 1996, the Conferences and Institutes Division (Educational Opportunity), and a faculty member, with support from International Programs, developed an English as a Second Language Adventure Program which resulted in recruitment of 10 of the 63 participants as graduate students.

Approximately 75% of students who begin MS programs complete their degrees within the 5 years allowed; registered time-to-degree is about 2.5 years. Time-to-degree at the doctoral level is more difficult to determine because of the relative newness of many doctoral programs. Available data show time-to-degree at about 4.5 years, consistent with national figures [6.2B5, Attachment E]. A high level of institutional support, full-time status, and individualized programs contribute to timely completion of degree programs. The Consultant Report [2.8F] recommended that the University decrease time-to-degree, but this might conflict with other University goals to encourage participation in international exchanges, internships and interdisciplinary work, as well as with possible growth in part-time students.



Research, Scholarship, and Professional Development

The commitment to research and scholarship in the graduate program is clearly indicated by the very high percentage (74% in 1992–96) of MS students who choose the research thesis or project option, as opposed to coursework [6.2B5, Attachment G]. Approximately 30% of our MS and PhD students are Graduate Research Assistants, supported by faculty research projects which lead to research theses and dissertations [6.2B5, Attachment C]. Research partnerships with faculty also lead to significant numbers of graduate student single-authored and co-authored journal publications. Graduate students present papers at national conferences, in part funded by travel grants from the GSC. The GSC also organizes the Multidisciplinary Poster Session (established in 1995), and the MTU Chapter of Sigma Xi, the Scientific Research Society, organizes a Research Colloquium (established in 1984); both are open to all students and involve cash prizes. The School of Forestry and Wood Products held an inaugural Poster Session for its own graduate students in 1997.

Other professional development opportunities include teacher training (see "[Recruiting and Retention](#)," above). Since 1992, the [PCW](#) has also offered Developmental Grants for Women Scholars to provide partial support for travel to present papers at professional meetings, off-campus research projects, ongoing research expenses, and living expenses. In 1997, 13 such grants were awarded averaging \$300 each.

Advisory Boards



As recommended by the Research Task Force [5.1B] and University Senate, a Research and Graduate School Advisory Board was established in August 1997, and includes representatives from academia, industry, government, and foundations. The College of Engineering and its departments, the College of Sciences and Arts, and the School of Forestry and Wood Products meet twice annually with their industrial or professional advisory boards to discuss curricula, educational goals and assessment, accreditation, research, and strategic planning. These advisory boards are selected to reflect the industrial/professional sector which will employ the graduates of the academic unit, and include members who hold graduate degrees and are interested in graduate education. Regular contact with advisory boards provides professional visibility for the graduate programs, valuable feedback and assessment from practicing professionals, and opportunities for research collaboration and graduate internships. Civil and Environmental Engineering's 1993/94 Annual Report [7.7A2] reflects the composition and charter of a typical board, as well as a meeting agenda and the kind of recommendations which result from a two-day visit. Advisory board members often interview graduate students and attend selected classes in their areas of expertise while on campus, and provide feedback to faculty based on their experience here.



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**Self-Study
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Strengthen and
Develop Graduate
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Continuous Improvement

Michigan Tech is well-situated to continue to accomplish its purposes and strengthen its educational effectiveness in graduate programs. Research opportunities and physical resources will be enhanced by the completion of several new research-oriented facilities (see "[Facilities and Technology](#)" below). The graduate programs in all departments will be assessed according to established assessment plans, and a plan is also under development to institute internal/external reviews of all graduate programs on a five-year cycle. A key area of concern is the continued emphasis on graduate program growth without planned and assured increases in external funding and on-campus resources for graduate students.



Strategic Planning

The Dean of the Graduate School, with the advice of the Graduate Council and the GSC, develops goals and strategies for the Graduate School which enter into the University strategic planning process. Graduate faculty provide direct input into this planning process through an annual review of the goals, objectives, and strategies.

The University remains committed to improving the quality and quantity of graduate school enrollment and programs. However, as noted earlier, ambitious goals for 1998 will not be achieved, and it is likely that the goals in the Quantitative Context for Planning [2.1D2] for graduate enrollment of 800–1,000 students will need to be revised based on a thorough review of the anticipated revenues for and projected costs of graduate programming, including funding required to enhance graduate student life and professional development opportunities. This review is particularly necessary in light of recent decreases in undergraduate enrollment, since a substantial portion of graduate student financial aid has been funded internally. The Consultant Report raised some serious concerns that such a review should address:

- the ability of the "lean" Graduate School staff to meet the needs of increased activity,
- the availability of external support to meet the costs of educating graduate students,

- the sufficiency of graduate course offerings, and
- the numbers of faculty with active external funding to support graduate programs.

Unless these concerns can be answered affirmatively, the Consultant Report suggested focusing on reducing time-to-completion of degrees rather than program growth.

One of the ways the University is strengthening graduate programs is to build graduate faculty capability. To meet a goal for total faculty start-up funds of \$300,000–400,000 annually, the Executive Vice President and Provost increased the 1997 total start-up and cost-share budgets to \$200,000 and \$400,000, respectively. The University annually awards faculty \$1.35 million from the REF, which aids graduate students directly through research assistantship support and indirectly through access to new facilities and equipment. Cooperative agreements with other academic institutions and research establishments through two new international consortia, Alliance for North American Mobility for Studies in Environmental and Mining Engineering (APEX) and Atlantic Mobility for Academic Studies in Engineering and the Environment (ATLAS), will also improve research opportunities for graduate students [2.6F4]. Research opportunities will be discussed more fully in [Chapter 8](#). Since 90% of the faculty are graduate faculty, and since the faculty advisor/graduate student mentoring relationship is the backbone of graduate education, a strong faculty development program enhances graduate education (see [Chapter 6](#)).

Another way the University is strengthening graduate programs is to develop sources of external funding. In 1996/97, 38% of College of Engineering graduate students were funded internally, and 34% from external sources [2.6A]. Because continued internal funding is limited, graduate enrollment will increasingly depend on external research support. While sponsored research funding has shown a steady increase in the last ten years, this growth rate may be difficult to sustain (see [Chapter 8](#)) and may negatively affect graduate student enrollments. A Research Task Force was established in 1995 to examine ways by which the University could improve its research capability, and respond to changing external research funding [5.1B]; however, its recommendations for creating a new organizational structure for research were not accepted by the University Senate.



Assessment and Program Review

Included in our Program for Assessment of Student Academic Success [2.7] are provisions for all departments to initiate student outcome assessment procedures with feedback mechanisms to modify and improve graduate programs. Also a systematic review of all graduate programs was one of the

plans for improvement recommended by the 1988 NCA Evaluation Team, and it was particularly endorsed by the Consultant Report [2.8F]. Since 1988, Humanities and the School of Forestry and Wood Products have conducted external reviews to evaluate their graduate programs, but there has been no University-wide formal procedure for regularly scheduled internal/external reviews. The development of a systematic program review process has been adopted as an objective within the University's Strategic Plan. To meet this objective, and in response to Graduate Council deliberations [6.2B5, Attachment B], the Dean and staff of the Graduate School are developing plans for systematic graduate program reviews on a five-year cycle basis.



Facilities and Technology

The completion of the Dow Environmental Sciences and Engineering Building, the renovation of Dillman Hall, and the addition to the Forestry Building will provide significant usable space for research, faculty, and graduate student offices, and lab facilities, generating superior working environments, more modern equipment, and more opportunities for graduate student learning and research. Facilities Management is positioned to meet current growth in graduate program requirements (see [Chapter 11](#)); however, it is not clear whether even the planned capital improvement will be adequate if graduate enrollment reaches 1,200-1,500 students by 2003.

Although Information Technology has added high speed computing to the resident apartments and residence halls and has dramatically increased the number of computer access points around campus as well as dial-in access (see [Chapter 10](#)), demand continues to outpace supply. Decentralized computing hinders cross-departmental usage of equipment, applications, or even e-mail, which causes problems with interdisciplinary research groups on campus.



Graduate Student Concerns

Given our remote location and modest name recognition in graduate programs, the University may need to offer better stipends, benefits, and professional development opportunities to compete with other programs for quality students. Although stipends have increased 17% since 1989, and are currently competitive, increases are based on University budget availability and competitive comparison with other universities. Stipends were last increased (by 4%) during 1994/95, and are not projected to increase in 1997/98, nor is the amount allocated to health care benefits.

In the 1996 Faculty Survey [6.2B4], about 62% of the respondents either strongly or somewhat agreed with the statement that the "Atmosphere in your department promotes a productive collegiality [that] includes graduate students." Slightly more than half of the respondents (55%) strongly or somewhat agreed that "Extensive opportunities are made available to graduate students for professional development." While these results are positive, there is room for improvement. Opportunities for graduate student professional development, particularly to develop teaching skills, are a concern for many faculty and graduate students. The Executive Vice President and Provost has stated that all departments will provide quality training programs for their teaching assistants starting with the 1997/98 academic year. As part of a recent meeting between the Dean of the Graduate School, graduate faculty, and graduate students [6.2B5, Attachment H], graduate students requested the development of a University-wide new graduate student orientation program, a seminar series on teaching, and support from the Career Center for graduate student placement. The GSC is currently working to address the safety of graduate students working after hours on campus, health benefits for graduate students, teaching and research assistant stipends, and treatment of graduate students on campus.



Integrity

The policies regarding research integrity and conflict of interest are implemented consistently and fairly with regard to graduate faculty. The policies are not thoroughly presented, however, for graduate student research. Sexual discrimination and sexual harassment policies are clearly stated for faculty and progress is being made to improve dissemination of information to graduate students. Efforts are underway to improve the climate for and numbers of women and underrepresented graduate students.



Academic and Research Integrity

The *Faculty Handbook* [1.2A] includes policies on research integrity, scientific misconduct, and conflict of interest, and emphasizes the importance of full and open disclosure, for which guidelines are presented. Student projects involving industrial or proprietary research are also discussed in the *Faculty Handbook* under research. All graduate students are required to sign the MTU Proprietary Rights Agreement and are covered under the University's Intellectual Property policy. The scientific misconduct policy applies to all graduate students and the conflict of interest policy applies to graduate students employed by the University. However, no

mention of any of these policies which apply to graduate students is made in the *Graduate School Bulletin* [1.3B].

Policies for graduate student conduct noted in the [Graduate School Bulletin](#) [1.3B] deal with coursework, not research, and refer students to the [Student Handbook](#) [1.2C], Student Rights and Responsibilities in the University Community [1.5C3], and the Academic Integrity Policy [1.5C5], designed primarily for undergraduates. With regard to graduate student research, the subject of scientific misconduct (particularly plagiarism) was addressed by the Dean of the Graduate School in an issue of *Out of the Blue* [7.4C, Winter 1996, Vol. 7, Issue 1]. The GSC and individual departments have also organized seminars and workshops dealing with academic integrity in general, and plagiarism in particular. This is not sufficient, and it is recommended that information concerning research-related activities and policies, such as scientific misconduct and conflict of interest, should be added to the *Graduate School Bulletin* [1.3B]. Also, these policies should be amended to make it clear that they apply to graduate students as well as faculty.



Affirmative Action

Sexual discrimination and sexual harassment policies are noted in the *Graduate Student Bulletin* [1.3B] and described in detail in both the faculty and student handbooks. One of the goals of the [Affirmative Action Office](#) for 1997 is to inform graduate students about University policies regarding affirmative action. Grievance policies and procedures are carefully delineated for faculty in the *Faculty Handbook* [1.2A], and an ombudsman is available, but there are no formalized procedures for graduate students except for procedures following dismissal for academic reasons outlined in the *Graduate School Bulletin*.

A survey of graduate students in 1992/93 by the PCW [5.5C, N=46 women graduate students, response rate=39%] showed that a majority of women students did not experience gender bias, but a sufficient number reported problems to cause concern. A majority of respondents reported experiencing some type of sexual harassment primarily nonphysical, such as jokes, stories, sexual innuendoes, and newspaper cartoons. No one reported feeling pressured or physically threatened to accept touching or kissing. The survey report contained several recommendations for aiding women graduate students who experience harassment and discrimination, many of which have already directly or indirectly been addressed by the University. Some improvement can be inferred from a 1996 Graduate Student Survey [2.8A3, N=150, response rate=50%, distribution not random] in which 11% reported that they believed they were treated unfairly or with disrespect because of gender. Because 31% of the

respondents were women, there appears to be a perception of gender bias by one-third of the women graduate students responding to the survey. The questions in the two surveys were somewhat different, so caution should be exercised in comparing the results.

Multiple commissions, task forces, and committees have addressed diversity issues on campus (see [Chapter 4](#)), and the PCW Climate Study [5.5C] included many recommendations specific to graduate students. While many of the latter appear to have been addressed in departmental implementation plans, some substantive recommendations that promise to improve the climate for women and underrepresented groups—a minority counselor, a women's center, a multicultural center—recur from report to report but remain unfulfilled. We have made progress on the recommendation to increase the number of women faculty role models (see Chapter 1, Response to [Concern 2](#)). It is recommended that the University continue to aggressively recruit women and underrepresented faculty and graduate students in disciplines where they are underrepresented, and develop undergraduate research opportunities for women and underrepresented students to introduce them to the possibilities of graduate education.



Course Offerings

A problem reported in some graduate student exit interviews is that some courses listed in the catalog are not offered on a regular basis. Recent program or personnel changes or varying levels of student interest cause this to happen periodically. Misunderstandings could be minimized by instituting strict reviews in the departments (or in the scheduling office) to locate persistent differences. Courses that are only offered subject to sufficient demand should be clearly identified.



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Graduate Education

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Overall, the University has worked to maximize its human, financial and physical resources in support of accomplishing its mission of graduate education, building on the strengths of a solid research foundation and a strong graduate faculty. Most of the recommendations for improvement in graduate programs presented by the 1988 NCA Evaluation Team have been accomplished: increased graduate student enrollments, a larger percentage of doctoral students, plans to increase the number of underrepresented graduate students, and more support for graduate fellowships. These accomplishments have given Michigan Tech a significant graduate presence. As growth begins to slow, questions about supporting and improving existing programs emerge, requiring attention to funding, allocation of financial aid and other support services, and assessment practices which provide feedback for continuous improvement of instruction and mentoring. The infrastructure of the Graduate School is adequate to support current levels of quality and productivity of programs and graduate faculty. However, continued rapid growth will strain existing resources. Recruitment and retention strategies, and computing and other academic support systems (e.g., the library and office space), demand centralized attention from the Graduate School.

In summary, the strengths, weaknesses, opportunities, and threats with regard to graduate education are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Mission statement • Internal financial support for graduate programs • Qualified faculty • Qualified staff • Innovative programs • Standards balanced by flexibility 	<p>Weaknesses</p> <ul style="list-style-type: none"> • No vision statement • No coordinated recruitment strategy • Heavy recruitment from MTU undergraduates • No regular external review process • Inadequate space, benefits, and professional development for graduate students

Commitment to research in MS and PhD programs

- Lagging recognition of programs
- Little diversity in student body
 - Unclear policies on research integrity
 - Climate for women and underrepresented groups
 - Limited General Fund dollars for graduate education



Opportunities

- Electronic information delivery
- Growing pool of women and underrepresented undergraduates
- Growing pool of supported international graduate students

Threats

- Inadequate external funding for growth

External Assessment of the Environment



Action Plan

To take advantage of opportunities and remedy concerns with regard to graduate education, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
Add subgoal 3, "Provide an	• Executive

1

environment that enhances the quality of graduate student life,” to University Goal 3 in the Strategic Plan.

Vice President and Provost

2

Revise the Graduate School mission, and complete the vision statement (in progress).

- Vice Provost for Research and Dean of the Graduate School
- Graduate School Staff
- Graduate Council
- Graduate Student Council

3

Develop a comprehensive recruitment strategy for graduate programs, coordinated by a new Graduate School staff member and departmental coordinators.

- Vice Provost for Research and Dean of the Graduate School
- Graduate School Staff
- Graduate Council
- Graduate Student Council
- Outreach and Multiethnic Coordinator

4

Develop and implement a University-wide graduate-student orientation which addresses teaching effectiveness and affirmative action issues, rights and responsibilities, and associated policies and procedures.

- Vice Provost for Research and Dean of the Graduate School
- Graduate School Staff
- Graduate Council
- Graduate Student Council
- Center for Teaching, Learning, and Faculty Development

Develop and implement

- Vice Provost

5

graduate program assessment tools to provide more feedback about areas for improvement.

- Vice Provost for Research and Dean of the Graduate School
- All Graduate Programs

6

Implement University-wide, systematic internal/external reviews of all graduate programs.

- Vice Provost for Research and Dean of the Graduate School
- All Graduate Programs

7

Address deficiencies of office space, computing facilities, library resources, and benefits experienced by graduate students.

- Vice Provost for Research and Dean of the Graduate School
- All Graduate Programs
- Facilities Management

8

Re-evaluate Strategic Plan objectives with regard to desired rates of growth for the current graduate programs.

- Executive Vice President and Provost
- Vice Provost for Research and Dean of the Graduate School
- Graduate Council

9

Aggressively pursue external funding for graduate student support.

- Vice Provost for Research and Dean of the Graduate School
- All graduate program faculty
- Advancement
- Government Relations

10

Incorporate an annual review of progress made in meeting the recommendations for improving

- Vice Provost for Research and Dean of

the climate for women and underrepresented graduate students into the strategic planning process.

the Graduate School

This action plan will be integrated into the strategic planning process for 1998/99.

ENDNOTES

1. Statistics cited here include total headcount for full- and part-time students, cited in the BIDs, but exclusive of headcount under the category "other." [BACK](#)

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Accomplishments

Multiple indicators of faculty productivity in [research](#), [scholarship](#), and creative activity all reveal that Michigan Tech faculty are fulfilling the University mission to enhance and expand research. These indicators include research expenditures (discussed under "[Financial Resources](#)"), sponsored research projects (basic, applied, and interdisciplinary), the establishment of Research Centers, scholarship and creative activities, and publications and citations.



Research Projects

Our increase in research expenditures (see [Table 13](#)) can be attributed to the increasing number of sponsored research projects generated by faculty and research institute staff. The Goal 4 Committee Report [6.2B6] lists a sample of significant projects funded since 1988. Some notable projects include:

- "Community and Ecosystem Dynamics of a Northern Hardwood Forest Exposed to CO₂ and O₃ in a Face System," \$2,000,000, funded in 1996 by the National Science Foundation, U.S. Department of Energy, and USDA Forest Service. PI—School of Forestry and Wood Products and Biological Sciences; cooperating institutions are USFS, Brookhaven National Lab, University of Michigan, University of Wisconsin, University of Minnesota-Duluth, and Mississippi State University.
- "Experimental and Computational Analysis of Shear-Flow Anomalies for Nearly Monodisperser Polymer Melts Solutions," \$286,209, funded in 1993 by the National Science Foundation. PI—Chemical Engineering and Mathematical Sciences; cooperating institutions University of Wisconsin-Madison and University of Alabama.
- "The Arctic Outflow Campaign: A Measurement Study to Characterize the Composition and Photochemistry of Arctic Air Transported Southward During Spring," \$100,999, funded in 1995 by the National Science Foundation. PI—Civil and Environmental Engineering; cooperating institutions University of Virginia, Purdue University, Western Michigan University, and York

University (Ontario, Canada).

- "Coupled Physical/Chemical and Biofiltration Technologies to Reduce Air Emissions from Forest Product Industries," \$189,053 funded by U.S. Department of Energy. PI—Biological Sciences and Institute of Wood Research.
- "A Study of a Copper Fuel Additive and a Silicon Carbide Diesel Particulate Trap on Heavy-Duty Diesel Emissions," \$175,000, funded by Lubrizol Performance Products Company. PI—Mechanical Engineering/Engineering Mechanics, Chemistry, and Biological Sciences.

New Research Centers



Several research projects have led to the development of research centers. A noteworthy example is the National Center for Clean Industrial and Treatment Technologies ([CenCITT](#)) funded by a \$6 million grant from the Environmental Protection Agency. Michigan Tech is the lead institution in a consortium which includes University of Minnesota and University of Wisconsin-Madison. The PI is a faculty member in Civil and Environmental Engineering and cooperating units include the Institute of Wood Research, Chemical Engineering, Metallurgical and Materials Engineering, Geological Engineering and Sciences, and Mechanical Engineering/Engineering Mechanics.

Scholarship and Creative Activity



In addition to sponsored research, many faculty engage in scholarship and creative activities which lead to publication (see below) and other creative outlets. As noted in "[Financial Resources](#)," the Vice Provost for Research has recently re-initiated Faculty Scholarship Grants to assist faculty with scholarship not typically funded by sponsored research. Examples of funded proposals include textbooks in biology, geometry, and engineering graphics design; travel to research sites in chemistry and social sciences; and teaching workshops and short courses [2.8D12].

Our [Fine Arts faculty](#) develop professionally and display their creativity through national and regional artistic exhibitions, musical activities (as performer, conductor, or composer), or dramatic performances (as director, playwright, or actor). They also contribute significantly to developing the local and campus culture for the arts. Annually, our nine Fine Arts faculty are involved in over 20 such activities, including the Chamber Chorus tour of eastern Europe and a prestigious international workshop on orchestral conducting in the Czech Republic.

Another measure of recognition is national awards. Faculty members in Mechanical Engineering/Engineering Mechanics, Metallurgical and Materials Engineering, and Chemical Engineering have recently received NSF Career Awards. A faculty member in Metallurgical and Materials Engineering also is an NSF National Young Investigator. In 1996, a professor in the School of Forestry was the youngest member ever elected to the International Academy of Wood Science.

Publications and Citations



Sponsored research, scholarship, and creative activity frequently lead to results which can be disseminated through publication. Publication is strongly encouraged by the University. The number of such publications is a measure of the vigor of activity at Michigan Tech. The Goal 4 Committee evaluated faculty publication output by comparing *Publications from Michigan Technological University*, a published list of faculty publications, for 1988–90 and 1994/95 [7.2A]. [1] Only papers in archival journals and in national/international proceedings were considered for this evaluation (publications in regional meetings or workshops, while evidence of scholarship or creative activity, are not subject to the same level of peer review). Results of this comparison are shown in Table 15, below. Faculty output increased substantially from 1988–90 to 1994/95, by 21% for archival publications and 37% for all publications. Since the number of faculty in each unit varies, and not all faculty publish, absolute numbers of publications must be judged with caution; however, this represents an average of 1.5 annual publication per faculty member in 1994.

TABLE 15. Faculty and Staff Publications by Academic and Research Unit.

It should be noted that research institute staff do not publish regularly, as the institutes have a different mission than academic departments—to engage in applied research and industry-sponsored development projects. In this respect, they supply needed technological expertise for industries and serve, in a different way than do the academic units, the University's mission as a disseminator of knowledge.

Another way to measure faculty accomplishment in a discipline is to determine how frequently their publications are cited by other scholars. The Goal 4 Committee attempted to determine the frequency with which Michigan Tech faculty publications are cited. This was somewhat problematic. Citations for 1994, requested in the 1995/96 Faculty Vita updates for all faculty, were examined and tabulated (self-citations were excluded). Less than half the faculty responded, and no comparative data was available. Although citations vary nationally among the scientific and technical disciplines,

the results suggest that some Michigan Tech faculty are well-known in their professions.

TABLE 16. Tenured/Tenure-Track Faculty Citations.

Additional information gathered revealed eight faculty who were cited more than 50 times in 1994, which suggests an international reputation, and 20 who were cited 20–49 times in 1994, which suggests that they too are widely known. Citations were also compiled by the College of Sciences and Arts and the School of Forestry and Wood Products in response to a Board of Control request in 1996. Over a three-year period, 80% of the graduate faculty in Sciences and Arts and 100% of the faculty in Forestry and Wood Products were cited in the citation indices related to their profession.

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Continuous Improvement

Michigan Tech is well-situated to continue to accomplish its purposes with respect to research. Graduate programs, research faculty, and physical resources all continue to improve, and with them, research funding grows. We are close to meeting targets in the strategic plan, but a perception of slowing growth has prompted a re-examination of the administrative structure for research. Increasing cooperation with other institutions enhances opportunities to develop long-term relationships that will foster collaborative research and partnerships.

Strategic Planning



The Vice Provost for Research, with the advice of the Research Advisory Council, develops goals and strategies for research which enter into the annual University strategic planning process.

In 1984, a long-range plan, *2005, Two Decades into Michigan Technological University's Second Century: A Long-range Plan* [2.1B], established ten- and twenty-year goals that relate to graduate education and externally funded research. The plan recognized the mutually beneficial roles of undergraduate and graduate education and research and the benefits that increasing research and graduate education would have on undergraduate education. Accordingly, the plan established a general goal of increasing the proportion of graduate students within the overall student body, and simultaneously, increasing the amount of external research funds on which it depends. Subsequently, the 1994 Strategic Plan [2.1D2] established several ambitious goals related to research for 1998 and 2003—increases in graduate student enrollment, research faculty, and federally funded research. Academic departments and research institutes also developed goals for research activity and strategies to accomplish them. These goals are revised annually as part of the strategic planning and budgeting process.

Although we have met targets established in the 1984 long-range plan, we are falling short on goals established in the 1995 Strategic Plan. As discussed in [Chapter 7](#), we have not met targets for graduate enrollment, although enrollment has doubled and enrollment in PhD programs is strong and growing. However, we have met targets to add faculty, and

research funding has nearly doubled; this puts us on target to achieve \$15 million in federally funded research in 1998. The Strategic Plan calls for Michigan Tech to double research funding again by 2003.

Although our success in approaching planned enhancements in research suggest that our policies and procedures are working, there is an increasing perception that growth is slowing despite the best efforts of faculty and staff. The Board of Control requested that the Vice Provost for Research develop a research prospectus; in that prospectus he identified some issues that concern the structure for research at Michigan Tech [7.4C]. As a result, the President appointed a Research Task Force in 1995, specifically to examine the University's research structure and develop recommendations to allow further improvements in research activity and productivity. In March, 1996, the Task Force produced a report, *Research at Michigan Technological University: New Culture, New Practices, New Organization* [5.1B], which made several suggestions.

- Establish a Michigan Tech Research Foundation.
- Emphasize the symbiosis between undergraduate education, graduate education, and research.
- Promote interdisciplinary research.
- Enhance career opportunities for post-doctoral associates, research professors, and other research specialists and more fully integrate these personnel into the educational aspects of the University.
- Reward the combination of excellence in teaching and research.

These results were disseminated in a series of campus meetings (University Senate, Academic Forum, public meetings) to generate public awareness. Although the University Senate did not approve the recommendation for a research foundation, several other recommendations of the Task Force have been implemented. The organization and structure for research at Michigan Tech was discussed at the October 1997 Board of Control Retreat.



Resources

With the exception of those issues noted by the Research Task Force, administrative and physical resources are satisfactory to support continued improvement in research. The completion of the Dow Environmental Sciences and Engineering Building, the renovation of Dillman Hall, and the addition to the Forestry Building will provide significant usable space for research.

However, increased start-up funds for research and equipment will be needed to strengthen research and scholarly activities.

The Consultant Report specifically noted the need for "seed" funds and the proposed 15% overhead incentive pool. The upcoming capital campaign presents opportunities to address these needs. Also, decentralized computing can hinder cross-departmental usage of equipment, applications, and even e-mail, which creates problems for interdisciplinary research groups on campus. As interdisciplinary research grows, this problem will need to be addressed.



Cooperation with Other Institutions

Faculty and researchers at the University are very active in cooperative research projects with colleagues at other institutions. These interactions include formal cooperation on grants with other institutions, through subcontracts for cooperating investigators; service as adjunct faculty at other institutions; and research conducted at other institutions while on sabbatical leave. The Sabbatical Leave Task Force [5.2B] found that our sabbatical rate was lower than peer institutions, which could negatively impact the development of new research programs. Recommendations are being reviewed by the administration (see [Chapter 6](#) for a full discussion).

Another form of cooperation with other institutions is membership in consortia. In 1994, Michigan Tech became a Sponsoring Institution of the [Oak Ridge Associated Universities](#) (ORAU) which directly manages Department of Energy programs of interest to Michigan Tech researchers and fosters collaborative research and partnerships among member universities. Membership in ORAU should have a positive impact on research at Michigan Tech.



Integrity

As Michigan Tech has developed as a research institution over the past decade, it has implemented new policies and procedures for fairly and accurately representing itself as a research institution and for dealing with researchers fairly and equitably. These new policies and procedures have been developed collectively by the Vice Provost for Research, Executive Vice President and Provost, and various University Committees in accord with the principles of shared governance. In part, they have been a response to problems in the 1980s with the integrity of a research and technology transfer venture.



Educational Support Institute/Ventures

In the early to mid 1980s, the Michigan Tech Board of Control authorized the establishment of the Educational Support Institute (hereafter referred to as "ESI") and

Michigan Tech Ventures, Inc. (hereafter referred to as “Ventures”). ESI/Ventures had three purposes: to benefit Michigan Tech by facilitating “the transfer of technology from the laboratory to the business world” [5.6A, p.3]; to support the University’s research and development activities; and to facilitate regional economic development. Significant problems with Ventures and the activities of its personnel tarnished MTU’s reputation and impaired the University’s ability to engage in profitable technology transfer. It has also, perhaps, made us overly cautious about engaging in potential opportunities for research and technology transfer. A detailed discussion of ESI and Ventures is contained in the Lewiston Report [5.6A], and financial implications are discussed in [Chapter 12](#).

Conflict of Interest



A Conflict of Interest policy statement and preliminary set of procedures in accord with NSF/NIH Guidelines was approved by the Board of Control in September 1995. A Conflict of Interest Coordinator was also appointed at that time to review all research contracts for potential conflict. The coordinator was also charged with developing a revised set of procedures.

Scientific Misconduct Procedures



The University is committed to use of the scientific method in the conduct of research. The *Faculty Handbook* [1.2A, section 3.3.5] contains a Scientific Misconduct Policy Statement and a set of Scientific Misconduct Procedures, which correspond to those used at the NIH with minor modifications made by the University Senate. Scientific misconduct is defined as that conduct by individuals which is inconsistent with the ethical conduct of research (according to the norms of the scientific method). These procedures protect the rights and reputation of both the individual(s) accused of misconduct and the individual(s) who alleged that misconduct has occurred.

Guidelines for Professional Ethics



The *Faculty Handbook* [1.2A, section 3.1.6] contains a "Statement on Professional Ethics," which spells out the responsibilities of faculty members to students, staff, colleagues, and the institution. As noted in Chapter 7, professional ethics also need to be understood by graduate students engaged in research and published in the *Graduate School Bulletin* [1.3B].

Safety



The *Faculty Handbook* [1.2A, section 3.1.4] lists committees and a review board, the Human Subjects - Internal Review

Board, which protect the safety of researchers and their human or animal subjects.



Policies and Procedures Regarding Proprietary Research and Patent Procedures

Michigan Tech's Patent, Research, and Proprietary Rights Policy, included in the *Faculty Handbook* [1.2A], is aligned with comparable statements from benchmark institutions such as Rensselaer Polytechnic Institute. The Intellectual Property Office (IPO) has been very aggressive in educating and updating the faculty on issues related to intellectual properties; this includes copyright information in the software industry, material transfer agreements, new patent practices, Small Business Innovative Research (SBIR), and other recent developments, through its quarterly newsletter, *Intellectual Property News* [7.4C]. In addition, IPO sponsors workshops and seminars. Three recent topics were "MTU 'Spin-Off' Businesses," "University Intellectual Property and Technology Transfer in Academe," and "New SBIR Programs." These workshops keep faculty and research associates abreast of current opportunities as well as provide a forum for on-going interaction between faculty and IPO staff.



Oversight Processes for Monitoring Contracts, Grants, and Relationships with Government, Industry, Foundations, and Other Organizations

Research Services' proposal and award tracking system was converted in 1994 to be more comprehensive and efficient in data handling and retrieval. In addition, two staff members in Research Accounting monitor the allocation and expenditure of research funding and grants for compliance.



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University Goal 4: Enhance and Expand Research, Scholarship, and Creative Activity Within the University

The Goal 4 Committee investigated research, scholarship, and creative activity conducted at the University. It evaluated how well the University is meeting the projected targets outlined in the University's Strategic Plan; the ways in which these activities support graduate programs and undergraduate instruction; and the relationship between faculty development and research, scholarship, and creative activity. Although graduate education and faculty development are intimately linked to research, they were addressed separately and fully in Chapters [7](#) and [5](#), respectively.

Please note: hereafter, the term "research" will be used comprehensively to include scholarship and creative activity, rather than interpreted narrowly as sponsored research.

This chapter draws primarily on the Goal 4 Committee Report [6.2B6], the Office of Research and the Graduate School Self-Study (see [Appendix 6](#)), and the Council of Graduate Schools Consultant Report [2.8F, hereafter called the Consultant Report] which constituted an external review of research administration and services. This chapter thus focuses broadly on overall research goals and accomplishments. For more detailed information about research programs in particular Colleges and Schools, please see [Appendix 6](#), or the departmental self-studies [2.6] available in the Resource Room.

Patterns of Evidence

Purposes



MTU will benefit the State of Michigan and

society as a whole through a balance of quality education, theoretical and applied research, and public service...The University will seek to enrich and benefit society through its research activities and will assist the community, the state, and the nation in economic and cultural development. (*University Mission*)

MTU will be a nationally and internationally recognized leader in meeting challenges of the future through excellence in undergraduate and graduate education and research in sciences and engineering... [I]n research, we will focus especially on growth in interdisciplinary approaches in areas of established strength and future need. (*University Vision*)

Michigan Tech clearly defines its research purposes in its mission and vision statements, thereby demonstrating the importance of research to the vitality of a technological university and the instructional currency of its faculty. All colleges, most schools, and all research institutes affirm that research, scholarship, or creative activities are fundamental purposes.

The research mission of the University was officially recognized in the 1984 Michigan Governor's Commission on the Future of Higher Education, which named Michigan Tech as one of the four research universities in Michigan. The University recently achieved Carnegie Doctoral II Status, and has fulfilled requirements for Doctoral I Status (see [Table 5](#), Chapter 2). Our mission and vision explicitly designate research as an institutional purpose, and research is a clearly articulated purpose in several of the President's ten expectations, published in the strategic plan [2.1D2], which state that the University should:

- be a model of research and teaching excellence;
- provide a strong research environment, thereby attracting high quality faculty and enhancing quality undergraduate and graduate education; and
- be a leader in promoting...creativity.

Institutional expectations for research, aligned with the University mission, are also articulated by the Board of Control, the *Faculty Handbook* [1.2A], departmental charters [3.4], and mission statements of the University's three research institutes [2.6G1, 2.6G2, and 2.6F6]. The Board of Control Manual states that "research work by academic faculty is expected..." [1.1, section 19.3], and the *Faculty Handbook* [1.2A] states that "research is an important contributor to...university education and to the prosperity of the industries and the population of the State," and that encouraging, fostering, and conducting research is therefore

"an indispensable function" of the University.

Faculty and research staff clearly understand the University's purposes related to research, scholarship, and creative activities. Departmental, College, and School promotion and tenure guidelines provide specific and detailed expectations for research. For example, the College of Sciences and Arts guidelines clearly refer to faculty as "teacher/scholars" and mandates that "research accomplishments are evidenced by publications, grants, (invited) presentations, citations. In the absence of all four it is very difficult to claim research accomplishments..." [3.4]. Fine Arts has guidelines [3.4] which clearly articulate measures of artistic and creative accomplishments specific to music, theater, and arts. These expectations are explained during the interview process for prospective faculty by Deans and Department Chairs [6.2B6, Appendix A] and reinforced through measures incorporated into the merit adjustment, promotion, and tenure processes. The application for promotion and tenure (Form F, [1.5A2]) includes a section dedicated to research, creative, and scholarly activities.

It is also clearly understood that research is conducted for the common good and depends upon the free search for truth and its free exposition. The Board of Control fully supports academic freedom:

The Board of Control of Michigan Technological University is committed to maintain Michigan Technological University as an institution where both students and faculty are free to pursue scholarship in an open and creative environment. The rights of faculty members to undertake scholarly approaches to their disciplines in accordance with professional standards in the classroom, in the laboratory, and in publications are guaranteed... [1.1, Policy 16.2.2 and reprinted in 1.2A, section 1.7]

Our scholarly purposes are demonstrated to the public through faculty and staff publications, applied research, and involvement in public and private boards. Through national, college, and school advisory boards, the public is kept informed and involved about our research.

Thus, we believe that our purposes with respect to research, scholarship, and creative activity have been clearly and publicly stated and are consistent with the mission of a doctoral institution.

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Resources

The University has effectively organized its human, financial, and physical resources to enable faculty and research staff to deliver high-quality research, and it has succeeded in attracting significantly more research funding since 1988. The Office of Research and the Graduate School (hereafter referred to as Office of Research) is efficiently linked to central administration, academic departments, and research institutes. Although, the administrative structure may not be optimal for attracting research funding, we are rapidly approaching our goals for federally funded research, and we continue to provide new incentives and information to assist researchers in securing sponsored research grants and contracts.

Administrative Structure



The organization of research administration is comparable to other research universities, and staffed appropriately for current levels of research activity. Projected increases in sponsored research may require additional support staff.

Responsibility for developing goals and strategic plans to enhance and strengthen research programs, as well as for administering research programs, rests with the Vice Provost for Research and Dean of the Graduate School, who reports to the Executive Vice President and Provost. The title of Vice Provost was added in 1991. Since this chapter focuses on research, we will refer to the senior administrator as the Vice Provost for Research. As noted in [Chapter 7](#), this administrator was judged an effective and highly qualified administrator by the Consultant Report [2.8F].

As shown in Figure 17, below, [Research Services](#), [Intellectual Properties](#), and five [Research Institutes and Centers](#) all report to the Vice Provost for Research. Only the Institute of Materials Processing and Keweenaw Research Center are not included within an academic unit; other institutes and centers are interdisciplinary units that involve faculty and research staff from various units.

FIGURE 17. Organizational Structure for the Office of Research and the Graduate School.

Vice Provost for Research and Dean of the Graduate School

Administrative Associate (Ofc. of Management, Budgeting, Fellowships, Assistantships)

Research Institutes and Centers

Director, Institute of Materials Processing
Director, Institute of Wood Research*
Director, Keweenaw Research Center
Director, Lake Superior Ecosystem Research
Director, Phytotechnology Research Center

Graduate School

Assistant to the Dean (Degree Audit and Certification)

Coordinator, Graduate Admissions
Specialized Clerk (Graduate Admissions, Fellowships,
Assistantships)

Research Services

Director, Research Services (Grant and Contract Administration)
Senior Secretary

Administrator, Sponsored Programs (Non-government Grants
and Contracts)
Grants Administrator (Government Grants and Contracts)
Office Assistant (Government Grants and Contracts)

Intellectual Properties

Manager, Intellectual Property Administration (Patents, Licensing,
Trademarks)
Senior Clerk

* also reports to the Dean of the School of Forestry and Wood
Products

In 1996, a Research Task Force recommended reorganization of
research administration [5.1B]. However, its recommendations for
creating a new organizational structure for research were not
accepted by the University Senate. This will be discussed in more
detail below, under "Continuous Improvement."

The University supports several mechanisms to create effective links
and information flows between central administration and individual
departments. The Vice Provost is advised by the Research Advisory
Council (comprised of College and School Deans and Institute
Directors), the University Senate Committee on Research Policy, and
the Coordinator of the Conflict of Interest Policy. The Consultant
Report noted that Deans and Directors expressed a strong desire for
the Vice Provost to play a stronger role in support of research.

Active research requires effective support functions. To improve
administrative efficiency, [Research Services](#) and [Intellectual
Properties](#) moved to the Office of Research in 1988 and 1992,
respectively. [Research Accounting](#), however, remains outside the
Office of Research and reports to Accounting Services. Support
services provided by the eight staff of Research Services and

Intellectual Properties were judged by the Consultant Report as excellent and well-coordinated with Accounting Services. Proposal and award tracking systems were converted in 1994 to be more comprehensive and efficient in data handling and retrieval. Research proposals initiated by faculty have increased dramatically, and are often processed close to submission dates, yet every proposal processed by Research Services has been submitted on time since 1988—a record to be proud of and evidence that the streamlining of proposal-processing procedures yielded efficiencies.

The same cannot be said of Research Accounting. Changes in accounting practices and software and personnel turnover have contributed to less than effective performance, and researchers often maintain their own accounting system to track research expenditures.

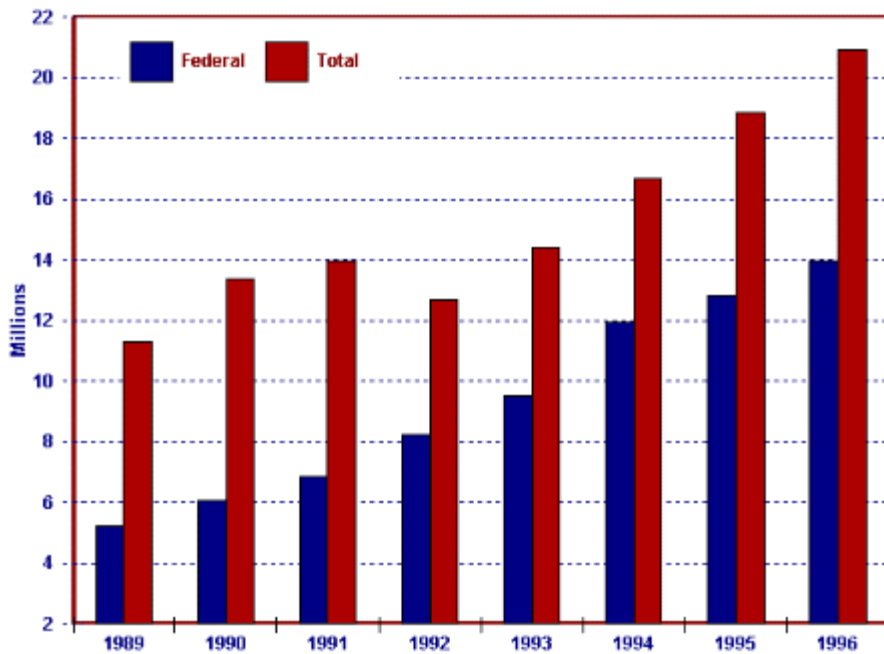
In order for faculty to apply for grants and contracts, they need timely information about opportunities. The Research Services staff publishes a monthly newsletter, transmitted by e-mail and on the WWW, which identifies upcoming proposal-submission deadlines for numerous agencies (e.g., National Science Foundation, Office of Naval Research) and non-profit foundations. It also maintains a small resource library and is available to assist faculty and researchers in obtaining information about existing or new programs and initiatives. The Consultant Report recommended that the Office of Research add a staff position to support faculty outreach and dissemination of information on grants and contracts opportunities.

Financial Resources



Michigan Tech's research base is expanding and reaching beyond its traditional engineering base. Although shrinking Federal support for university research presents a challenge, it has continued to grow at Michigan Tech; we are rapidly approaching our goal of \$15 million in federally funded and \$21 million in total research by 1998 [2.1D2] (see Figure 18).

FIGURE 18. Sponsored Research Expenditures



Source: Research Accounting

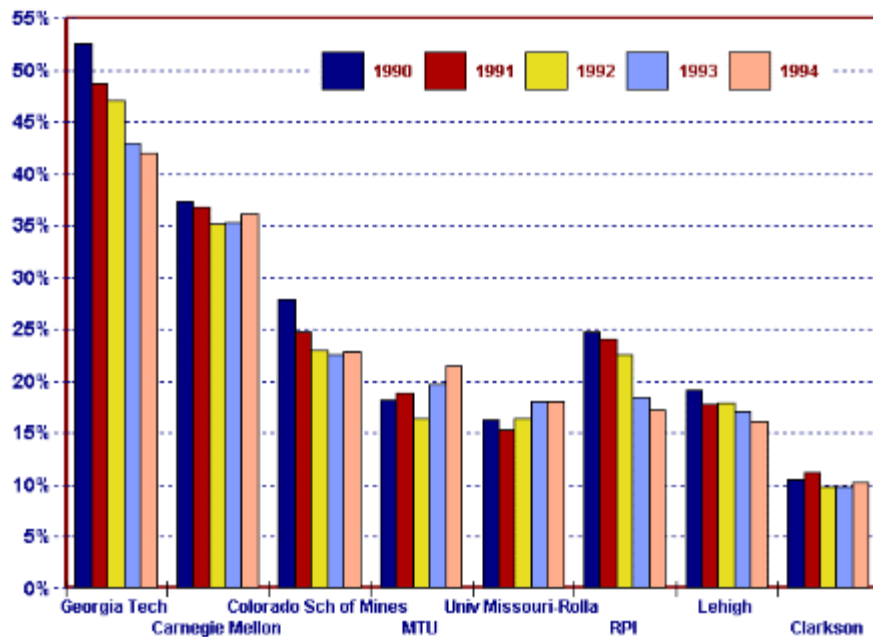
Research expenditures doubled from \$11.3 million in 1988/89 to \$20.9 in 1995/96 (see Table 13). The College of Engineering accounted for 50% of the expenditures, the College of Sciences and Arts 13%, the School of Forestry and Wood Products 15%, and research institutes 22%.

TABLE 13. Sponsored Research Expenditures, by Departments, Colleges, and Schools.

Benchmark comparison data available for 1993/94 showed that we were fourth in total research expenditures as a percentage of total expenditures and fifth in absolute dollars of total expenditures among our seven benchmark institutions (see Table 14 and Figure 19). While most institutions showed research expenditures declining or relatively flat as a percentage of total expenditures, Michigan Tech's grew from 17.9% to 22.8%. This attests to our growing strength in sponsored research.

TABLE 14. Total Research Expenditures—1993/94.

FIGURE 19. Percentage of Total Research Expenditures



Source: IPEDS Finance Surveys (Current Fund)

Physical Resources



Facilities constructed since 1988 and planned facilities will significantly increase our ability to conduct effective research in engineering and science and pursue creative accomplishments in the arts. See [Chapter 11](#) for a detailed discussion of facilities.

Research also depends on adequate equipment, library resources, and computing. The Century II Endowment Equipment Fund provides a modest endowment to provide matching funds for use in equipment acquisition. The amount of funding has varied from \$13,000 to \$33,000 per year over the last eight years, a small amount which nonetheless contributes to the development of the University's research capability. While computing is adequate, the Library is often not adequate for research (see [Chapter 10](#)).

Faculty Incentives



The most important resource for expanding research, scholarship, and creative activity is quality faculty. Recruitment and development of faculty were discussed in Chapter 6. Five incentives for faculty and research staff to engage in scholarly activity through sponsored research include:


1. a portion of the research-grant overhead captured by the college/school Deans, Department Chairs, and principal investigators (PI);
2. graduate-fellowship funding tied to research grants;
3. the REF (Research Excellence Fund);
4. grant and contract cost share; and
5. Faculty Scholarship Grants.

As research grant dollars increase, so does the amount that academic units can capture from overhead and for graduate students, which strengthens the links between research and quality graduate education. A total of 25.3% of the overhead funds are returned to departments (12%), colleges and schools (7.3%), and PIs (6%) to be used to support research and scholarship, equipment, and travel to conferences by faculty or graduate students. Returned overhead to academic departments increased by 59% from \$341,000 in 1988/89 to \$541,000 in 1995/96. The number of doctoral students who received external funding through graduate research assistantship and fellowships has also increased significantly. Graduate fellowships have grown from 65 in 1989/90 to 94 in 1996/97. Portions of the fellowship dollars have been tied to research grants, which provides added incentive for including graduate research assistantships in grant budgets.

A third incentive to faculty and research staff productivity in research is the Michigan REF. A State program, REF is used by the University to competitively fund specific one-year exploratory projects and to provide three-year start-up funds for new, longer-term programs. The University also contributes support for these projects through cost-sharing, the allocation of graduate fellowships, and other supplemental funding. Priority is given to projects and programs which support the development of PhD programs on campus, involve investigators from more than one academic unit and are interdisciplinary, and are likely to attract continuing support or contribute to economic development within the State. The amount awarded varies annually, usually around \$1.3 million. From 1992–94, over half of REF funds were awarded to cross-departmental projects which involved multiple researchers.

An additional incentive for researchers to apply for grants and contracts was the University's decision to allocate \$300,000 for cost-share beginning in 1993. The pool was increased to \$400,000 in 1996/97. In 1995, the Vice Provost for Research established a \$70,000 Faculty Scholarship Grant fund (formerly called the Faculty Development Fund) to support scholarly activities typically not funded by sponsored research or REF funds. These grants were made to individuals, rather than project groups. This program revives a creativity grant program, the suspension of which in the 1980s left a gap in providing seed money for research and non-sponsored scholarly activities.





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University Goal 4: Enhance and Expand Research, Scholarship, and Creative Activity Within the University

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SWOT Analysis

Strengths in the allocation of administrative, financial, and physical resources have enabled Michigan Tech to make great progress in research since 1988, including attaining Carnegie Doctoral II status. To meet goals for the future and continue to improve, new faculty will need more start-up funds, and all faculty will need more equipment and development funding. The organizational structure for research may also need to change, and Research Accounting needs to be able to provide timely and accurate information to researchers.

In summary, the strengths, weaknesses, opportunities, and threats with regard to research are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Clear mission • Doctoral II status • Multiple incentives for research • Advisory boards • Graduate program growth • Meeting targets for growth in research volume • Effective policies in place for intellectual properties and research integrity • New facilities 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Insufficient start-up funds • Insufficient seed money and equipment funding • Research accounting for sponsored programs • Effects from problems with spin-offs
	
<p>Opportunities</p> <ul style="list-style-type: none"> • Industry and government partnerships • Communications 	<p>Threats</p> <ul style="list-style-type: none"> • Competitive external research

technology which enables cooperation with other institutions

funding

External Assessment of the Environment

Action Plan

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To take advantage of opportunities and remedy concerns with regard to research, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Increase "seed money" for research: start-up funds, Faculty Scholarship Grants, and equipment funding.	<ul style="list-style-type: none">• Vice Provost for Research• Executive Vice President and Provost
2 Improve accounting for sponsored programs.	<ul style="list-style-type: none">• Treasurer/Chief Financial Officer• Vice Provost for Information Technology
3 Implement Advisory Boards for all units.	<ul style="list-style-type: none">• Individual Units

This action plan will be integrated into the strategic planning process for 1998/99.

ENDNOTES

1. The annual *Publications from Michigan Technological University* ceased to be published after 1990, and was

just reinstated with a 1994/95 publication.[BACK](#)

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University Goal 5: Provide a Rewarding and Challenging Work Environment in which Staff Meet or Exceed Expectations

The Goal 5 Committee investigated the current environment for professional and unionized [\[1\]](#) staff and their accomplishments with respect to the University mission. In addition to reviewing documentary evidence, the Goal 5 Committee conducted and evaluated a staff opinion survey. A copy of this survey and summary results are included as in the Goal 5 Committee Report [6.2B7], and will be referred to hereafter as the Staff Survey.

This chapter draws on the Goal 5 Committee Report [6.2B7], the Human Resources Self-Study [2.6H8], and the Affirmative Programs Self-Study [2.6H3]. Please see these reports for more detailed information.

Patterns Of Evidence

Purposes



Staff create and maintain the support systems which must operate for the educational process to function. They contribute directly and indirectly to the other seven University Goals. In their daily work, staff are often the first contact for students who seek assistance in a variety of matters. They participate in the recruitment of quality students, faculty, and staff. They facilitate instruction, research, and advancement opportunities. They maintain the University's physical plant and safe environment.

Although Michigan Tech's mission and vision statements do not explicitly mention the role of staff at the University, the dedication of one of the eight strategic goals to staff in 1994 stressed that staff are critical to fulfilling the University

mission. Staff were not mentioned in University planning documents before this time.

Objectives under Goal 5 emphasize the importance of compensation, professional development, evaluation, governance, diversity, and appropriate staffing levels. Two documents which clearly outline University policies for staff include the Policies and Procedures Manual [1.5E] and the *Staff Handbook* (in process). In addition, the Human Resources and Affirmative Programs Departments publish policies that govern processes and procedures for staff.

At the departmental level, however, goals for staff, including the ways in which staff are expected to contribute to departmental goals, are neither clearly articulated nor consistent across departments [2.6]. Administrative departments and academic support units, which consist predominantly of staff, are more likely to address the objectives that are related to staff than are academic departments, which have proportionately fewer staff.



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Resources

Staff constitute human resources, and they need adequate financial and physical resources to meet University expectations. Physical resources such as facilities and computing equipment are discussed in Chapters 10 and 11. Computing and office equipment did not appear to be concerns in the Staff Survey.

Administrative Structure and Human Resources



The creation of the position of the Executive Vice President and Provost in 1992, combined with the elimination of two vice president positions, has led to a centralized "chief operating officer" model. An advantage of this structural change has been improved communication among administration, faculty, staff, and students through the integration of administrative and academic units under one executive vice president. The Executive Vice President and Provost meets semiannually with all academic units and annually with all other administrative units.

The staff is divided into several categories: executive managerial, professional, technical, clerical/secretarial, skilled crafts, and service/maintenance (see [Table 17](#)). Presently, some staff are represented by one of three unions (see "[Collective Bargaining](#)"), and we will refer to them as "unionized staff." Exempt managerial and professional staff and a limited number of nonexempt support staff are not unionized, and we will refer to them here as "professional staff." Current organizational charts for administrative and academic departments are available in the Resource Room [3.1A].

The number of regular, full time (at least .75 FTE) staff has increased by 17.9% from 644 in 1988 to 759 in 1996. However, staff has increased in some categories and declined in others (see [Table 17](#)). Professional staff have grown substantially while technical and clerical/secretarial have declined. Growth in professional ranks is due in part to growth in Information Technology and graduate programs, and also to some reclassifications from clerical/technical to professional. The lack of growth or decline in other staff categories strains staff resources in responding to growth in

the number of faculty, researchers, and graduate students.

TABLE 17. Staff by Classification.

Category	1988	1996	Change
Executive Managerial	44	51	+7
Professional	180	304	+124
Technical	61	58	-3
Clerical/Secretarial	206	180	-26
Skilled Crafts	37	41	+4
Service/Maintenance	116	125	+9
Total	644	759	+115

Source: Institutional Analysis (Fall Headcount - Full-Time).

Collective Bargaining



The clerical/secretarial group is represented by the United Auto Workers (UAW), the skilled crafts/service/maintenance group is represented by the American Federation of State, County, and Municipal Employees (AFSCME), and the public safety officers are represented by the Police Officers Association (POA).

In 1992/93, the Mail Services staff accreted into the AFSCME unit. Also in 1992/93, the UAW Technical unit decertified, which left only the clerical unit represented by UAW. In that same year, the professional staff voted against unionization.

Hiring and Promotion



In 1991, Affirmative Programs developed the [Hiring Guide](#) [1.5B2], which was distributed to all departments on campus. Updated in 1994 and 1996, this guide provides detailed information on all policies and procedures that govern the hiring process. The MTU hiring philosophy mandates that no hire can be approved if the candidate has not met all of the posted requirements for the position. Human Resources works with departments before they post a position to define essential functions and develop appropriate, related requirements. Managers establish the requirements as they relate to the current needs of each unit. Before an approval of hire is granted, the Affirmative Action Officer verifies that these requirements are met.

One frustration that has been identified by the staff is the lack of a career path within many units of the University. The institution has many small, often highly specialized departments. Larger departments, like Information Technology and the Library, have more opportunities for career paths. One solution to this problem has been for the employee to move to a different department; while this can be

disruptive to the continuity within a department, it does offer the advantage of broadening employees' perspectives.

Diversity



Diversifying the staff has been a goal of the administration since 1988. We have an [Affirmative Action Plan](#) [2.5D] to monitor hiring and set goals for protected class members at the University. The plan uses various legally defined factors to determine availability of qualified prospective applicants. Along with the current utilization analysis and the expected openings for the coming year, goals for all departments, including staff, are generated. Progress reports on these goals are shared with the President annually. In 1996, women constituted 47.2% of the total 759 full-time staff, which included 25.5% at the Executive Managerial level. Total underrepresented group representation for full-time staff was 3.6% in 1996. The staff classification with no representation for underrepresented groups is "Skilled Crafts." The highest level of representation is in Executive Managerial with 5 of 51, or 9.8% in 1996 (See [Table 4, Chapter 1](#)).

In addition to diversifying staff, multiple initiatives have been taken to increase staff's understanding of diversity issues. Educational Opportunity offers programs specifically designed to increase diversity and cultural understanding for all areas of the University. In 1991, Michigan Tech staff members attended off-campus National Coalition Building Institute (NCBI) workshops that addressed prejudice and effective methods to counteract it. In 1996, 13 staff, 3 faculty, and 8 students were trained to lead NCBI workshops on our campus. Several workshops have now been offered. In 1991, President Tompkins established the [PCW](#) (Presidential Commission for Women) and the PCD (Presidential Commission on Diversity). In 1994, the PCW produced "A Study of the Climate for Women at Michigan Technological University" [5.5C]. Findings and recommendations of the study were presented to the administration and the Board of Control. By using these recommendations, each department on campus developed plans to improve diversity. One recommendation which has been implemented is the resurrection of the Keweenaw Personnel Directors, a group of local Human Resources directors, to share job vacancies, job descriptions, benefit packages, and salaries in order to work toward spousal accommodation.

Governance



Staff participation in the governance of the institution has grown significantly since 1988. One of the first serious efforts to include staff in the governance of Michigan Tech was begun in 1989 by the Vice President of Operations and Finance. Large sessions were organized across campus to

educate the Operations and Finance staff about participative management. Reactions were mixed—from excited acceptance to staunch resistance. Over the years, understanding of the roles and acceptance of the greater responsibilities of shared governance have evolved.

In 1990, the Staff Council was formed to advise the administration, including the President, on issues of interest and concern to staff. Since the Faculty Senate represented some, but not all, professional staff, an effort was initiated to consolidate representation of all professional staff under the Senate. Following a public hearing hosted jointly by Staff Council and the Faculty Senate, an election was held, and professional staff overwhelmingly voted to seek additional representation by the [Senate](#). Under the new Senate constitution, approved by the Board of Control in 1997 (see [Chapter 6](#)), professional staff representation increased significantly from three to nine representatives to include representation for nearly all non-unionized staff.

At the departmental level, staff involvement in departmental governance has been minimal and inconsistent. In departmental self-studies [2.6], most departments do not indicate how staff are involved in governance issues, but a few did express how staff are involved in decision making. Examples of staff involvement in both academic and administrative departments range from self-directed work teams to departments where staff have full voting rights on most issues.

TQE (Total Quality Education) initiatives also involve staff in governance (see "Quality Service Education").

Financial Resources



Since 1988, compensation administration has undergone extensive revision. The UAW successfully organized the clerical and technical employees in January of 1991; their campaign highlighted compensation and pay practices. This led the administration to review the compensation/classification system. In 1990, Hay Group consultants were retained to create a system that would address University needs. As a result, in 1992 staff salaries were restructured around implementation of the Hay compensation system [2.6H8]. Since then, market pressures and the nature of our specialized departments have influenced us to tailor our compensation system to meet our needs. The objectives for the MTU compensation program are to

- retain valued employees,
- attract qualified employees,
- motivate individual performance, and
- treat employees fairly. [\[2\]](#)

The bargaining units use local markets to drive their compensation plans. Two units with pressing pay issues are the UAW and the POA. In consultation with the administration, five-year pay plans have been developed to address those wage concerns.

Benchmarking revealed that many universities have considered outsourcing the services provided by staff in order to save money. Outsourcing issues are of great concern to staff, although the administration has not pursued this option.

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Accomplishments

Michigan Tech is meeting the goal of providing an environment that is rewarding and challenging in which staff meet or exceed expectations. In the Staff Survey [6.2B7], staff judged their work environment as acceptable, although they report room for improvement (Question 6). Staff feel safe in their work environment (Question 7) and find their jobs challenging. This is true especially for the professional staff. By and large, staff find their jobs rewarding (Questions 13 and 14).

Training and Development



Opportunities for growth for professional staff have expanded since 1988. A Training and Development Coordinator was hired in Human Resources in 1990, but this position and the entire training function (Office Systems and Training), in Information Technology, was eliminated when the administration responded to a financial crisis with a reduction in workforce (see [Chapter 12](#)). In 1993, the TQE coordinator became responsible for training and development, and offered a number of development programs for the campus, such as computer training [2.6H8]. In addition, Human Resources personnel offered "Lunch and Learn" sessions to campus personnel. In 1993, MTU began supporting participation in the Bryn Mawr Summer Institute for Women in Higher Education Administration for women staff. Five staff have completed this one-month program and received administrative internship opportunities upon their return to campus.

In order to improve training and development for staff, we need to evaluate staff performance. Before 1992, Michigan Tech did not have a formal performance evaluation instrument for staff. In 1992, Human Resources developed and implemented a performance appraisal for all staff which included performance ratings, identification of developmental goals and objectives, and an improvement plan. The instrument was redesigned in 1996, based on feedback from all affected employees. In addition, in 1992 President Tompkins asked the Staff Council to develop an instrument which would provide feedback to supervisors, including himself. The resulting supervisor evaluation instrument is administered by Institutional Analysis in part to determine supervisory training and development needs.

In 1995, the Executive Vice President and Provost sponsored a TQE team to examine training needs on campus. The Training Improves Productivity team (TIP) recommended that the administration

should place more emphasis on staff training, especially computer and supervisory training [5.3B]. This report was submitted to the administration and shared with the Deans and Directors in the summer of 1996. Consistent with the recommendation for leadership development, support for training for managers and supervisors was funded for 1997/98. A number of one-day seminars and courses have also been offered to staff. They include: Supervisory Skills, Time Management, Delegation, Laughing Matters (Stress Management), and Goal and Priority Setting. Participation in all of these sessions has been voluntary. Several recommendations from the TIP team are still under consideration.

In spite of these improvements in training and development, staff are concerned that they cannot keep current in their fields. A review of departmental self-studies [2.6] revealed a consistent lack of support for training and professional development in both academic and administrative departments. Although a few departments have allocated money for staff training and development, most have not. There seems to be some apathy among staff and supervisors about staff training.

Compensation



The common perception that most staff are compensated below current market is due in part to the prevailing wisdom that staff realize only inflationary increases and in part to the fact that new hires brought in at competitive market rates generate salary compression. In response to these concerns, the administration has provided equity dollars for professional staff to correct the most serious salary inequities.

Benefits constitute a significant portion of the employee's compensation package. The University has adopted a benefits philosophy and established a University Fringe Benefits Committee, both of which provide guidance in the review and development of fringe benefits. A number of improvements have been implemented since 1988. The University has engaged in a Preferred Provider Organization (PPO) since 1995, which has resulted in cost savings to employees. We hired a wellness coordinator in 1991 as a second prong in our effort to reduce health care costs through preventive measures. In 1996, the University also instituted a flexible benefits program in order to allow employees to direct their benefit dollars to their best advantage. Other benefits improvements include:

- the initiation of a sick leave pool in 1993,
- the award of a retirement bonus for employees in the Michigan Public School Employees Retirement Systems (MPERS) program in 1992,
- the enhancement of the University's Teacher's Insurance and Annuity Association College Retirement Equities Fund ([TIAA-CREF](#)) contribution in 1997 through a matching program, and

- In addition, the University has continued to pay the full health benefit premium for employees and their families.

One of the objectives of the University, and Human Resources specifically, is to continue favorable relations with the three labor unions and to continue to develop pay equity plans for each union. We are making sound progress here, as Human Resources has successfully employed issue-based bargaining with both the UAW and POA. As with unionized staff, professional staff also have a long-term comprehensive plan for equity adjustment which was implemented in 1996.

Quality Service Education



In 1991, President Tompkins arrived with an agenda to introduce TQE to campus as part of his initiative for shared governance. A TQE Manager was hired in 1992 to support the President's initiative, and in 1993 the TQE office was renamed the Quality Service Education Office. A number of TQE teams whose members include staff have been successful in improving University processes. Staff have been empowered through this process to improve the University environment. Eight TQE teams have provided recommendations that have streamlined operations in departments or in cross-departmental projects. Improvements have been recognized in student recruiting and registration, scheduling, receiving money and gifts in Advancement, and SDC membership increases.



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Continuous Improvement

The staffing level of the University can be best characterized as lean, given all of the additional expectations that accompany our changing role and mission. In many cases, staff are being asked to do more and different things than in the past. Efforts are being made to improve compensation in recognition of these new demands. However, the University continues to be adequately staffed to accomplish its basic functions. The University is in a strong financial condition and is well positioned to respond to emerging needs as necessary. For example, Student Affairs recently added a number of staff in response to recommendations of the Retention Task Force Report [5.4A]. Like all higher education institutions, the University must be prudent in committing to new positions, but at the same time it must be flexible in responding to identified needs.

The mechanisms for shared governance are sufficiently well established to allow meaningful staff input into assessment and planning for the future of the University. Supervisor and performance evaluations, as well as periodic staff surveys, allow the institution to identify and address potential problem areas as well as issues of quality with regard to the staff. The strategic planning process allows staff input from all areas of the University; this process is ongoing. The Staff Council and the University Senate provide additional venues for staff input.

The increased recognition of the importance of education, training, and development also assures that staff will contribute effectively to the continued strength of the institution. The development of individual improvement plans through the performance appraisal process will assure that maximum benefit is realized from such development activities.

The initiation of supervisor training in the fall of 1997 marks an important step in improving the training and development activities of the University. Quality Service Education will continue to offer professional development programs for staff and will work with Information Technology to provide computer training, which was identified by staff as the top training need.

Integrity



In general, MTU staff feel that the University has demonstrated honesty and integrity in its dealings with them (Staff Survey Question 21).

The introduction of a performance appraisal instrument in 1992 represents an effort on the part of the administration to introduce consistency to the evaluation of staff performance. The University has established classification/compensation systems for staff to provide consistent and equitable treatment which includes a process for appeals to assure accurate placement within the system.

The hiring process is monitored and upgraded as needed for compliance and for effective recruiting. The *Hiring Guide* [1.5B2] was developed in 1991 and updated most recently in 1994; it is distributed to all departments on campus to provide detailed information on all policies and procedures that govern the hiring process.

To assure an environment free of harassment and discrimination, the University adopted a Discrimination and Discriminatory Harassment Policy in 1995. In addition, an Americans with Disabilities Act Committee was established in 1992 to assure fair treatment of all individuals in the campus community.

Generally, questions of fairness in hiring practices and employee treatment have been resolved within current internal procedures. All claims filed with external agencies, such as the Equal Employment Opportunity Commission or the Office of Civil Rights, were dismissed or dropped.

In 1991, in response to the layoff of 50 staff that resulted from the fiscal crisis of that Fall (see [Chapter 12](#)), the University adopted a recall policy designed to provide preferential treatment in rehiring the affected employees. Ninety percent were rehired within two years.

Support for the development of a *Staff Handbook* is a manifestation of the administration's commitment to the principle that all staff are entitled to fair and equitable treatment. The *Staff Handbook* has been under development since 1995 and is scheduled for completion during the 1997/98 academic year.





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Self-Study Report

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Professional and Unionized Staff

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SWOT Analysis

The Goal 5 Committee judged that the University has made substantial progress in its treatment of staff since 1988. Salaries have improved, fringe benefits have been enhanced, and the staff has assumed a more central role in the shared governance of the institution. Progress has been made in providing training and development opportunities, but additional opportunities are needed. Professional development must continue to be a priority if the staff are to be allowed to realize their full potential.

In summary, the strengths, weaknesses, opportunities, and threats with regard to the staff are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Hard working, dedicated staff • Low turnover rates • Long-term plans for compensation policies • Quality Service Education Office • Competitive benefits package 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Uneven administrative support for training and development at the departmental level • Lack of career paths for staff • Lack of coordinated technology and training
	
<p>Opportunities</p> <ul style="list-style-type: none"> • Changing technology offers staff the opportunity for professional growth • Talented pool of local applicants 	<p>Threats</p> <ul style="list-style-type: none"> • Rapid rate of technological change • Location makes recruiting difficult for some positions

- from which to recruit employees
- Positive university-community relationships
 - Location may make recruiting some individuals easier due to life style considerations

External Assessment of the Environment

Action Plan



To take advantage of opportunities and remedy concerns with regard to the staff, the following action plan is recommended. Responsible parties are designated.

What	Who
1 Continue to expand professional development opportunities for staff.	<ul style="list-style-type: none"> • Executive Vice President and Provost • All Departments
2 Expand methods to increase staff diversity and emphasize this objective in hiring policy and practice.	<ul style="list-style-type: none"> • Human Resources • Affirmative Programs • All Departments
3 Explore the possibility of promotional ladders for staff.	<ul style="list-style-type: none"> • Human Resources

This action plan will be integrated into the strategic planning

process for 1998/99.

ENDNOTES

1. Forty individuals in the Professional Staff category are non-unionized non-exempt staff. [BACK](#)
2. Understanding Classification and Compensation, MTU Human Resources, May 1995 [2.5E] [BACK](#)

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University Goal 6: Provide Comprehensive Information Technology Services

Delivering information technology services to the university community is a complex and decentralized activity at Michigan Tech. The Goal 6 Committee investigated and evaluated delivery of library and computing services. Each will be addressed separately in this chapter.

This chapter draws primarily on the Goal 6 Committee Report [6.2B8], the Library Self-Study [2.6F5] and the Information Technology Self-Study [2.6H9]. Please see these reports for more detailed information.

LIBRARY

Patterns of Evidence



Purposes

Michigan Tech has a single central library, the [J. Robert Van Pelt Library](#) (hereafter referred to as the Library). Its vision to be a campus-wide center for advancing information management initiatives, technologies, and resources is consistent with the University mission to educate its students to meet the changing needs of a technological society and to provide inhabitants of the State with scientific knowledge to promote the welfare of Michigan's industries. Whenever feasible, the Library has decided to select electronic access over ownership for research materials. The Library, by providing access to information, is instrumental in enabling freedom of inquiry for faculty and students.

Resources and Accomplishments



The Library has qualified professional staff and is effectively organized to deliver library services to the University community and State residents. The University's commitment to the library is demonstrated by library funding that keeps pace with the growth of the University's General Fund. Nonetheless, the escalating cost of serial publications (the mainstay of an engineering and science university library) and technology for automation and electronic access, the demands generated by graduate program growth, and limited physical space all make it difficult for the library to meet all of the University's purposes. The library is responding to these inadequacies by innovative use of electronic resources and document delivery. MTU's peer institutions have been experiencing these same challenges with respect to building and maintaining quality research libraries.

Administrative Structure



Library administrative and professional staff are well-organized and well-qualified. The director and 11 professional staff hold masters degrees in library science. Five professional staff have retired since 1990, and vacancies were filled through national searches. To reflect the importance of technology to library services, a restructuring in 1994/95 created clearly defined career paths in either automated and technical services or research services. An assistant director was designated for each area. The balance between professional (16 positions) and support staff (17.5 positions) is consistent with other State-supported Michigan universities. The library depends somewhat less on student workers (24% of total staff) than other Michigan university libraries (36%). A 1993 user survey rated staff performance highly (4.2–4.5 on a 5-point scale).

Financial Resources



Since 1988/89, library expenditures have increased 47% to \$2,719,000. However, library expenditures as a percentage of total University expenditures remains flat at 2.6%, compared to our eight benchmark institutions, the Library ranks third in percentage of total expenditures, and seventh when comparing dollars expended per full-time-equivalent student (FYES). The library receives additional funding through gifts, such as \$6,000 from Friends of the Van Pelt Library in 1997 for the undergraduate collection, and \$12,900 from the Minority Programs Task Force in 1988–91 for materials relevant to African- and Native-American experiences.

Compared to libraries at other Michigan state-supported universities, the Library spends more on materials and less on salaries and wages as a percentage of library expenditures. We spend 50% on materials (Michigan average is 35%)—the

highest percentage in the State—and 36% on salaries and wages (Michigan average is 49%). Although the director and some professional staff receive competitive salaries, the lower expenditures may impede the library's ability to attract and retain high quality staff.

The Library Collection



Although the Library's expenditures for acquisitions have grown by 57% since 1989, the collection has grown by only 9%. This reflects in part the exceptional inflation in the cost of scientific journals and monographs—an average of 12% annually over the past four years. In response, two cancellation projects in 1986 and 1991 reduced the number of journal subscriptions by 1,000, and a third is being considered. Eighty-eight percent of the library's materials budget is dedicated to serials. This is the highest percentage allocation for serials in the State (Michigan average is 50%); at \$179 in serials expenditures/FYES, it ranks second only to the University of Michigan at \$211/FYES. The explanation for this pattern is simple: the library's collection serves the purposes of an engineering and science research university. Research in engineering and science is documented in serial publications more than in monographs, and MTU library collection policies reflect this bias.

While serials expenditures are high, our expenditures on non-serial collections is second lowest in the State at \$24/FYES, compared to a high at the University of Michigan of \$149/FYES. It is estimated that \$200,000–\$500,000 would be required to redress weaknesses in the books collection. The strong emphasis on journals and serials makes the Library more labor-intensive than collections based on monographs and books.

The total library collection is approximately 780,000 volumes, half of which are government documents. The remaining 390,000 volumes represent 154,000 individual titles (both monograph and serial or continuation titles). The collection also includes 447,000 microforms. The Library is a selective Federal repository for government publications. Documents are selected to support the missions of many academic departments and to reflect the interests of the residents of the First Congressional District of Michigan, which fulfills a University purpose of serving the general public. In addition, the MTU Archives and Copper Country Historical Collection is a nationally recognized depository of historical documents on copper mining.

The acquisition and maintenance of library materials is a primary task of all university libraries. The nature of the collection is undergoing a transformation. Historically, the Library collected undergraduate-level materials necessary to train engineers for positions in industry. A manual

comparison of library holdings to citations in Books for College Libraries III undertaken between 1989 and 1995 [2.4B5] showed that the undergraduate holdings of the library strongly mirror MTU's traditional areas of study in the sciences and technology (with match rates of 50%–55%) and particularly in geology and engineering (match rate of 72%). Departmental self-studies and a student survey suggest the undergraduate collection is satisfactory.

However, in the past decade, new and expanded graduate programs, heightened expectations for faculty research, more international representation, interdisciplinary programs, and new curricula in social sciences and humanities all require a significantly different kind of collection. Because of the smaller size and relative youth of the non-science programs, the library collection is weaker in these areas. To insure that limited funds are directed to the most critical collection needs by active faculty, the library employs an active faculty-liaison system and a faculty-driven University Library Committee to assist in decisions about book and serial purchases. Nonetheless, the Goal 6 Committee judged collections to be insufficient to meet the stated research and educational purposes of the University. Thirty-nine percent of graduate students surveyed in 1996 were not satisfied with the library [2.8C] and nine departments, five of them PhD granting, cited the research and graduate collections as inadequate [6.2B8]. Faculty gave the Library low ratings on the Faculty Survey [6.2B4]. This was a concern of the NCA Evaluation Team in 1988, and unfortunately it remains a concern of the University today.

In response, the Library has expanded interlibrary loan and document-delivery services and developed electronic formats for access and delivery of library materials. The Library has tripled the number of interlibrary loans since 1988 and become a net borrower of materials. This shift from ownership to access is not cost-free (see below).

Automation and Computerization



The Library has changed substantially in the area of computerization. Since 1988, it has had relationships with three separate library automation vendors and now works in a development partnership with Endeavor Information System Inc. (EISI), which provides the [Voyager](#) automation system. Voyager was fully operational in 1995. It provides on-line, WWW-based access to the library catalog and an internal information-management system which automates and streamlines acquisitions, volume check-in of serials, and reserve materials. This new automated management system will allow the library to gather data to analyze collection use and needs.

A key feature of the Library is its ability to deliver

information remotely. In addition to information provided by Voyager, the library also provides remote access to selected databases (some full-text) via the WWW. While some information is difficult to distribute due to the use of multiple operating systems on campus (see "Computing" below), other information is too costly to distribute remotely. Some peer institutions are ahead of the Library when it comes to availability of electronic databases and information technology training. The Library has no interactive electronic classroom in which to train users in the latest information-management techniques, and it is difficult to schedule training in departmental computer laboratories because of heavy usage. Nonetheless, by June 1997 all but two of the Library's electronic databases were available over the WWW to campus users on their desktops. Information Technology is helping the library to address technological problems.

The widespread belief that access to electronic resources will bring cost savings has not materialized. While hardware costs continue to fall, the costs of maintaining, supporting, and reinvesting in up-to-date hardware continues to rise. Vendors of electronic materials usually price their products higher in order to protect their interests. As a result, expenditures for electronic collections, nonexistent in 1985/86, were \$65,000 in 1996/97 [6.2B8, Note 4]. Hardware and training for library staff also has associated costs.

Support Services



In addition to providing access to collections for teaching and research, the Library provides numerous support services, such as bibliographic instructional programs for students and teaching assistants, a copy card system, a Career Resource Center with job-hunting materials, extended archives hours, a library web site to deliver resources to users, and group study space for student teams. All of these services are new since 1988.

Space



The library building constructed in 1966, suffers from a shortage of space. With 49,000 square feet of space, the library building is full to capacity. In 1995 the Program Statement for the Library Building Program estimated a shortfall of over 75,000 square feet of assignable space and stated, "The thirty-year old building is inadequate for library purposes regarding space, information technology, service and environmental issues. It cannot carry out the mission of the library and the University" [2.4C4]. ABET evaluators cited the lack of study and storage space in the Library as a problem [6.3B and 6.3A] and in 1996, journals stored off-site were attacked by an outbreak of mold. Emerging technologies also require appropriate space. In addition to space concerns,

the building has problems with heating and cooling and the furniture should be upgraded.

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Continuous Improvement

The Library has improved in many ways since 1988. Library services are strong, and there is greater electronic access for patrons both within and outside of the Library. Planning for wireless infrared networking capability in the Library began in Summer 1997; this will allow users with laptops to log onto the network. Improvements in the network backbone of the library building will greatly increase the speed of electronic library transactions and facilitate the work of library staff.

Goals in the 2000 capital campaign include library renovation, a \$2.5 million book/periodical endowment, a \$2.5 million technology endowment, and a \$347,000 interactive classroom [2.1D3]. Success here would address inadequacies in collections, space, and instructional needs identified above.

Space is perhaps the most critical issue for the continuation of University purposes. Planned building improvements are listed in the MTU Facilities Special Maintenance and Renewal 6-Year Plan 1996 [4.6C4] and in the Facilities Management Self-Study [2.6H7] and include installing emergency lights and a generator, replacing the Library's chiller and cooling tower, and library renovation and interior renewal. The Long-Range Capital Planning Committee recommended renovation of the current library building as well as additional space for compact shelving of library materials in a new Science and Information Resource Center adjacent to the current library building. This would release space in the current building for storage and study space. When the State authorizes its next capital outlay appropriation, this Center will receive highest priority by the University.



Integrity

The University demonstrates integrity in its practices and relationships related to the operation of the Library. Procedures are in place to deal with employment issues, and they are followed. References to the Library in University documents are generally accurate, although the description of the size of the collection is somewhat misleading since, as

noted above, fewer than half of the stated 780,000 volumes are in the general collection, and this collection constitutes only 154,000 unique titles. Statements regarding progress toward addressing problems recognized with the library buildings and collections since at least 1988 have been somewhat optimistic, however, given the slow progress to date.

Given the clearly expressed need for improved library collections since at least the last NCA visit, the process for approving new PhD programs raises a concern. Request forms for each of the 7 new PhD programs approved since 1988 indicate that no additional library resources would be necessary to implement those programs. This omission appears to be factually incorrect, and has not been addressed in the planning process.



SWOT Analysis

In evaluating how well the Library has met the purposes expressed in its vision, the Goal 6 Committee judged that the library performs well on meeting the service needs of the MTU community and has made progress in becoming "a center of advancing information-management initiatives, technology and resources." However, the growing MTU research and scholarly community continues to be concerned about the available materials collection. The Committee recommended that the campus needs to be engaged in a dialogue over the relative effectiveness and costs of building the Library's local collection versus accessing information for use through electronic means or document delivery.

In summary, the strengths, weaknesses, opportunities, and threats with regard to the Library are as follows:

Internal Assessment of the Organization	
Strengths <ul style="list-style-type: none">• Highly competent staff• Automated management system and other technological upgrades• Instructional program that emphasizes electronic resources• Successful faculty-liaison program for book purchases	Weaknesses <ul style="list-style-type: none">• Collection size and composition• Space for the collection and study• Difficult access to 70,000 volumes stored off-site• No interactive electronic classroom• Building infrastructure

- Nationally recognized Archives and Historical Collection
- Active Friends of the Library
- Expanded advancement initiatives

(heating/cooling, lighting, furniture)



Opportunities

- Growing availability of materials in electronic format
- National recognition of crisis in serials cost escalation

Threats

- Rapid inflation of serial-publications costs
- Volatile rates for electronic materials
- Costly purchase and maintenance of computers
- Changing formats of electronic media

External Assessment of the Environment



Action Plan

To take advantage of opportunities and remedy concerns with regard to the Library, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
Initiate dialogue to achieve campus-wide consensus on ownership of vs. acces to research materials: what should the Library purchase and retain for its own collection, and what should it provide access to through the use	<ul style="list-style-type: none"> • University Task Force

of methods such as interlibrary loan and document delivery.

2 Develop an action plan to address monograph collection shortcomings.

- Library Administration
- Library Task Force

3 Anticipate synergies between Information Technology and Library services and develop better network access appropriate to our distributed computing environment.

- Library
- Information Technology

4 Address space deficit with short- and long-term solutions.

- Long-Range Capital Planning Committee

5 Set priorities for proposed improvements.

- Strategic Planning Process

6 Publicize services and upgrades widely and quickly.

- Library staff

7 Accurately represent University document collection to include government documents.

- University Relations
- Institutional Analysis

8 Re-examine Library mission/vision.

- Library administration and staff

This Action Plan will be integrated into the strategic planning process for 1998/99.

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COMPUTING

Patterns of Evidence

Purposes

Computing at Michigan Tech is decentralized. [Information Technology](#), the [Computer Advisory Committee \(CAC\)](#), and individual units all have significant responsibilities for managing computing on campus. Information Technology's goals to provide information and information technology tools and to develop information technology solutions which enable the campus community to communicate and work effectively, and to integrate information and educational technologies, are necessary and appropriate for a technological university with a mission to educate students to meet the changing needs of a technological society. [Providing access to information](#) lays the groundwork for freedom of inquiry for faculty and students.

Resources



Through a decade of dynamic change in computing, the University has managed the human, financial, and physical resources dedicated to computing to accomplish its goal of delivering comprehensive information technology services.

Administrative Structure

The University supports computing both centrally through the Information Technology organization and staff and locally through academic and administrative departments. The campus maintains four distinct types of computing:

1. *University-wide technology services*, managed by Information Technology, which includes campus-wide

- services such as [e-mail](#), [distance learning technologies](#), and the [university data network](#);
2. [administrative computing](#), managed in part by Information Technology and in part by administrative departments;
 3. *academic faculty and staff computing*, managed by academic departments; and
 4. [student computing](#), managed by academic departments and Information Technology (Pace Lab).

Information Technology has reorganized several times since 1988 and now has an efficient structure of seven subunits (see Figure 20) appropriately organized to deliver central computing services.

FIGURE 20. Organization Chart for Information Technology.

Vice Provost-Information Technology

Distributed Computing Services

[Messaging and Mail-enabled Applications](#)

[Campus-wide Information Services](#)

[Software Services](#)

[Distributed Systems Coordination](#)

[Graduate Student Internship Program and ADDOC](#)

[Team](#)

[Future Products and Services Research](#)

Administrative Computing

BANNER® System Support

JRVP Library Project

[Electronic Factbook](#)

University Data Administration

Telcom Customer Service

Telephone Service

CATV—MTU Movie Channel

Ameritech Contract Administration

AT&T Contract Administration

ACUS Contract Administration

Voice-mail Service

Work Order

Finance and Billing

Equipment Maintenance

System Administration Services

System Administration Services for Administrative Depts.

Pace Labs

Educational Technology Services (ETS)

[Audio/Visual Support](#)
[Satellite Services](#)
[Electronic Display System](#)
Network Operations Center (NOC)
[Media Production](#)

[Technical Support](#) for:
Board of Control
Commencement
Cultural Enrichment
Convocation

[Telcom Engineering](#)

Cable Physical Plant
Data System
Voice System
Video System
Network Security
Performance Management
Residence Life Network
System Administration
Command and Control Systems

[Distributed Computing Services](#) (formerly Academic Computing Services) specializes in electronic information services such as [e-mail](#), [WWW](#), and [USENET News](#). [Telecommunications services](#) were added in 1990 to reflect the convergence of voice, data, and video technologies. In response to downsizing in 1991, Information Technology shed most of its systems administration responsibilities (discussed below) and outsourced training. Information Technology has experienced, technically qualified personnel. A new director was hired in 1994 through a national search process, and in 1997 this position was elevated to Vice Provost for Information Technology to reflect the importance of information technology to MTU's mission. Information Technology employs 55 full-time staff and 50 students. One measure of staff competence is the receipt of three university distinguished service awards since 1993.

Decentralization led to some initial problems with coordination. Hardware was sometimes purchased without consideration for networking requirements or technical support. To address the coordination issues, in 1989 the CAC was established to provide oversight in decision-making regarding university computing. The [CAC](#) works with the Vice Provost for Information Technology and has five standing sub-committees.

1. The Computing Strategy Subcommittee coordinates drafting of departmental computing strategies to develop the University's Computing Strategy.
2. The Systems Administration Council provides a forum

- for local systems administrators.
3. The Campus Computing Standards Subcommittee provides a forum for discussion of campus-wide computing standards.
 4. The Acquisitions Subcommittee reviews large computing expenditures.
 5. The Subcommittee on Fees approves changes in student fees and recommends policy for their expenditure.

CAC recommendations go to the Computer Executive Committee (CEX—the Provost, Deans, and other key administrators) for approval. This structure has been effective in addressing problems and setting direction for computing on campus.

Managing local systems administration support is perhaps the most difficult aspect of administering a distributed computing system. Until 1994, Information Technology provided systems administration for most of the campus. Now all academic and administrative departments are responsible for their own local hardware, software, and support. Most have responded by hiring their own local systems administrators and support staff who are responsible for the machines in their departments and local network access. These local systems administrators have no direct line of responsibility to Information Technology. For most units, this is a successful organizational strategy for distributing computing services. However, low salaries, external demand, and internal competition for systems administrators contributes to disruptive turnover. Because most administrative departments were too small to justify individual systems administrators, Information Technology created [Systems Administration Services](#) (SAS) in 1995 in response to users requests. SAS services the needs of all administrative departments and charges a monthly fee per machine for this service. Small academic units such as Metallurgical and Materials Engineering and Mining Engineering have decided to share a systems administrator.

Coordination of local systems administration occurs through advisory committees, administrative channels, and informal means. Although a Systems Administration Council was organized in 1995 as a CAC subcommittee to provide a forum for systems administrators to share ideas, systems administrators remain somewhat isolated, and the University provides no career path and only limited training. Another problem is the absence of formal mechanisms to identify qualified substitutes if a systems administrator is absent. In Spring 1997, Information Technology began coordinating discussions to enable systems administrators within the colleges and across campus to cooperate and provide back-up for each other. Information Technology will provide emergency back-up and assistance to units with technology-related needs.

Information Technology is also working to enhance student life and learning through its Inter-Residence Hall Technology Advisory Council.

The decentralized structure provides departmental flexibility and autonomy at a time when technology changes rapidly and needs vary dramatically. However, the University has yet to reach the balance between decentralization and centralization which would optimally utilize increasingly expensive technology and provide uniform availability across departments.

Physical Resources



Michigan Tech responded to the computing industry's shift from mainframes to personal computers by implementing a distributed computing system which connects nearly 3,000 campus computers and utilizes three platforms: IBM-compatible, Macintosh, and UNIX-based. This includes 1,025 student stations and 29 networked student computer labs. We decommissioned our mainframe in 1996, when the transition to the Voyager system for the Library was complete. The structure to administer this system has evolved to respond to campus needs. For a detailed discussion of this transition, see the Information Technology Self-Study [2.6H9].

Access to on-campus computing is good. Students have access to the campus network and local area networks through student computing labs in their home department, or through the Pace labs administered by Information Technology, which supports 450 students in Biological Sciences, Physics, Social Sciences, and Sciences and Arts Undeclared. A goal of 10 students/computer in student computer labs has been reached in most labs. Virtually all full-time faculty and professional staff have computers and all are networked. Although access to computing is generally good, the limited life span of hardware and software creates an ongoing challenge to maintain and replace computer equipment. Also, the use of three platforms—IBM-compatible, Macintosh, and UNIX-based—can make translation across platforms difficult.

In 1994/95 MTU discussed establishing a supercomputing center on campus for research, but for cost/benefit reasons opted instead to rely on external computers for high performance needs. Matching funds are available for researchers who need to use these external facilities.

The campus network is rarely down. To ensure the quality of the network, a program of infrastructure improvements is ongoing. These will be discussed below, under [accomplishments](#).

Rapid changes in computing and telecommunications technology require continual upgrading of equipment and infusions of staff time. This puts a strain on the University's budget at a time when State support for higher education rarely outpaces inflation. Fortunately, in 1996/97, MTU received a \$927,000 supplemental appropriation from the State for technology, which has been expended for information technology. Even so, all faculty and staff needs are not met.

Academic departments fund student computing through student computing fees. Each academic department sets its own basic computing access fee for its students. These fees have grown substantially as computing needs and costs grow; total revenues from student basic access fees increased by 56% in just two years, from \$900,000 in 1994 to \$1.4 million in 1996. Departments can also charge additional fees for courses designated "computer-intensive." Students are dissatisfied with the magnitude of these fees; however, students work with faculty and staff on the CAC to ensure that all fee increases are justified. All changes to student computing fees (or new fees) must be approved annually by the Subcommittee on Fees of the CAC.

Faculty and staff computing were funded until 1995 entirely at the department level through budgeted SS&E funds or discretionary funds. Departments are not permitted to use student lab fee income for faculty and staff computing. Information Technology subsidizes network connections but charges student labs (\$10/connection/month) and faculty and staff (\$13/connection/month) to connect to the network. Budget cuts and reallocations (discussed in Chapter 1 under [Concern 3](#)) led many units to reduce SS&E budgets, which in turn led to shortfalls in faculty and staff computing.

In 1993 the CAC recommended that \$1,000/year/faculty be allotted to academic departments from the General Fund to support computing. The central administration responded by gradually dedicating general funds to faculty computing; in 1995/96, approximately \$400 per faculty member was provided and in 1996/97, the amount increased to \$800. Some departments continue to use discretionary funds and some individual faculty use research funding to upgrade computers. Matching funds for administrative- staff desktop computing are also now available annually on a competitive basis. In 1996/97, \$100,000 was allocated for replacement costs.

Distributed computing works best for units which generate sufficient funds at the department level through student enrollments and research funding to cover their computing costs. When the size of an academic program fluctuates, however, sustaining faculty and student computing is a

challenge. Decentralization also makes savings from shared software, group purchases, and other cooperative arrangements difficult to realize. There is some concern that a widening gap is forming between technology "haves" and "have nots" on campus.

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Accomplishments

University-wide Computing

To succeed in its mission to provide information technology that will enable the campus community to communicate and work effectively, Information Technology has built an excellent computing infrastructure, often in partnership with other campus units. Significant infrastructure accomplishments include:

- installed a fiber-optic backbone (1988–91);
- recabled all campus buildings, standardized in TCP/IP (1988–91);
- installed a satellite uplink (1990);
- implemented campus-wide e-mail (1990);
- implemented the BANNER® administrative system (1990–94);
- implemented the Admissions and Recruiting module to streamline admissions process (1991);
- renovated studio classroom/teleconference facility distance education programs (1995);
- implemented Voyager automated management system in the Library (1995);
- implemented voice mail for students, faculty, and staff (1996);
- upgraded the dormitories for communications, which included Cable TV/Movie Channel, high-speed data connections, and enhanced telephone services (1995–2001);
- established an electronic interviewing center for the University Career Center (1995);
- began moving computer labs into the residence halls (1990–94);
- upgraded lecture halls with multimedia equipment (1994–2001); and
- acquired and further developed EDS to provide information on a timely basis (1993).

In 1976 and again in 1989, two failed attempts were made to replace the administrative computing system developed in-house. In 1990 a third attempt succeeded thanks to a partnership between Information Technology and administrative staff, who selected and rapidly implemented the BANNER® system. BANNER® is an integrated software

application suite that addresses five major administrative functions: Student Services (Admissions, Degree Audit, Housing, Registration, and Scheduling), Financial Aid, Finance, Alumni/Development, and Human Resources/Payroll. Applications are run against data stored in an Oracle relational data base management system. In addition, the entire printing and mailing systems were upgraded. This conversion realized substantial savings and efficiencies for both Information Technology and administrative areas.

E-mail, voice mail, and cable in the dorms all experience heavy use and significantly enhance communication both on- and off-campus. All students, faculty and professional staff have e-mail accounts and access to WWW, USENET news services, and Gopher through desktop computers or lab facilities. In 1996, MTU sent over 80,000 messages a day via e-mail. E-mail and WWW access have made it significantly easier, given our remote location, for members of the University community to maintain professional relationships with colleagues around the globe. Efforts are under way to use the WWW to streamline administrative processes such as the annual reporting of faculty vitae and student recruiting.

One consequence of the success of electronic communication is that students, faculty, and staff now expect dial-in access to the University's network and the Internet from off-campus. The University's modem pool is currently too small to meet the dramatic increase in demand. In 1996/97 the Computer Advisory Committee established the Modem Task Force to address the issue of modem availability for MTU constituents and to recommend how an expanded service should be provided and funded. The Modem Task Force recommended that MTU expand their services by offering a fee-based subscriber service and that the University consider using an outside provider for the service. The recommendations of the Modem Task Force are being implemented in 1997/98. The University will also continue to maintain a free public-access dial-in service as required in its membership charter to Merit Network, Inc. (a regional high-speed data communications network of public universities).

The mission of integrating information and education technology is enhanced by these infrastructure accomplishments, but the full promise of technology-assisted instruction has yet to be realized. New services which need to be better publicized and utilized include electronic classrooms, teleconferencing capability, distance education delivery capability, and library databases. To broaden usage, Information Technology has scheduled a series of departmental talks in 1997 to introduce MTU faculty to these new services. The new CTLFD (Center for Teaching, Learning, and Faculty Development) is also charged with facilitating this interaction. The Fall 1997 seminars co-offered

by CTLFD and Information Technology on using information technology were fully subscribed. Information Technology has also been working with the local school systems through the K–12 Telecommunications Advisory Board to develop technology plans.



Academic and Student Computing

Most students, faculty, and staff have access to state-of-the-art machines, software, and multiple platforms. Departmental self-studies reveal that computing is well integrated into the curricula and student computing facilities are given high priority by most academic units. However, the University does not support a central instructional computing center or support personnel to assist faculty with integrating computing and multimedia into the classroom. Information Technology and the CTLFD are beginning to address this issue by sponsoring workshops. Except for a few of the smaller units, departments appear satisfied with the level of the hardware available to students and with the network. While student fees continue to grow, the rate of increase has slowed and may be stabilizing.

External accreditors report satisfaction with MTU's accomplishment of educational goals related to computing. At its last visit in 1993, ABET stated that "computer services at the university, the college, and department level appear to be adequate, reasonably accessible to faculty, staff and students, and are used extensively in the engineering courses" [6.3]. ABET also noted excellent progress in areas they identified as problems in their previous visit. The Society of American Foresters' accreditation team registered similar satisfaction with computing at their last visit [6.5A2].



Continuous Improvement

MTU has an effective system for managing and planning for technological change which utilizes consensus building across campus.

- Information Technology continuously plans for improvement in infrastructure that will keep MTU on the cutting edge of technology.
- Each campus unit is required to submit an annual report which identifies its philosophy of computer use and develops one-year and three-year plans for computing.
- Shared governance brings faculty, staff, and students together in committees to address computing issues and solve problems. The CAC and *ad hoc* committees (17 since 1991) have addressed questions that relate to large equipment purchases, networking standards, lab

fees, lab quality, printing, systems administration, high-speed computing, Macintosh issues, e-mail standards, and classroom networking. Committee reports are usually approved and implemented.

New initiatives already planned by Information Technology for 1997 and 1998 to continuously improve the infrastructure include:

- acquiring and implementing remote computing technologies for delivery to on- and off-campus MTU students and faculty,
- establishing a WWW interface for the administrative student system to enable students to check their records and information,
- piloting a University calendar and resource scheduling system to reduce the time needed to schedule campus-wide meetings,
- developing methods to streamline the faculty vitae information gathering process, and
- adding electronic capabilities to seven lecture halls on campus.

A threat to MTU's future computing capability is staff turnover, driven in part by non-competitive salaries. In 1996/97, five of the six engineering departments and several other units lost their systems administrators and Information Technology lost five professionals. As Information Technology notes in its self-study [2.6H9], this is a common problem at universities. MTU's remote location in a small town may exacerbate this problem. Human Resources' compensation policy compared systems administrators to other professional staff on campus to establish salary ranges; because the market for systems administrators is more competitive than most other professional staff, this policy is being revised. Another strategy for reducing turnover is release time and funding for professional development and continuing education. Because continuing education and travel to conferences for systems administrators are not allowable charges against student lab fees, Information Technology is dispersing a pool of matching funds (\$8,000 in 1996/97) to the Systems Administration Council for this purpose. Another possible solution is the School of Technology's recent decision to implement a curriculum for training systems administrators. This will create co-op opportunities in Information Technology and improve the availability of local qualified professionals.



Integrity

The Goal 6 Committee found the descriptions of technology available on campus to be accurate. Episodes of questionable

management of resources for information technology during the transition to distributed computing have been identified and policies and systems (described earlier) have been instituted to maintain higher standards. In particular, the Provost's policy on student-lab-fee income [1.5D1] states that all such income must go into a separate account and that expenditures from that account can only be used to support student computing. In their annual computer reports to the CAC, departments must show budgets which comply with this policy. The CAC recently discovered a significant violation and new fees were disallowed, but no reimbursement had been made as of this writing.

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SWOT Analysis

The Goal 6 Committee judged that the University is meeting its goal to provide comprehensive information technology services. Computing is widely available and information technology tools are used effectively to increase communication. However, more can be done to utilize existing resources to integrate information and educational technologies. In the face of rapid changes in computing, finding adequate financial resources to meet campus needs remains a challenge.

In summary, the strengths, weaknesses, opportunities, and threats with regard to computing are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Flexible, responsive administration of computing • Well-maintained network • Universal, convenient computer/Internet access • Local control and flexibility • Integration of computing in curricula • Successful integrated administrative computing (BANNER®) • School of Technology's new systems administration program 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Insufficient oversight of student lab fee expenditures • Financial strain for small departments • Inefficient interdepartmental resource sharing • No instructional computing center or support personnel • Staff turnover • No career path and limited training for systems administrators • Insufficient backup for systems administrators • No on-campus high performance facilities



Opportunities

- Continuing increase in the speed and power of information technology
- Enormous potential of the WWW for on-campus and distance education

Threats

- Limited lifespan of hardware and software
- Enrollment fluctuations which undermine student lab fee system

External Assessment of the Environment



Action Plan

To take advantage of opportunities and remedy concerns with regard to computing, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Establish annual mechanism for accountability for student lab fee expenditures, which is independent of process of establishing new fees.	<ul style="list-style-type: none">• CAC• Executive Vice President and Provost
2 Develop central instructional computing center to help faculty integrate computing and educational technologies.	<ul style="list-style-type: none">• Center for Teaching, Learning, and Faculty Development• The Library• Information Technology
3 Review salary levels and improve professional development opportunities for systems	<ul style="list-style-type: none">• Human Resources• Information

administrators.

Technology

Increase base budget funding for faculty computing to CAC's \$1,000/faculty target.

- Office of the Provost

This Action Plan will be integrated into the strategic planning process for 1998/99.

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University Goal 7: Develop the MTU Campus and Continuously Maintain the Physical Plant

The Goal 7 Committee investigated and evaluated how effectively and efficiently Michigan Tech's physical plant supports University purposes and meets strategic planning objectives. In 1988, the NCA Evaluation Team found the physical plant "very well maintained and well suited to...[the University's] focused technological mission" [6.1A]. This chapter addresses what we have accomplished since 1988 to develop and maintain the physical plant.

This chapter draws on the Goal 7 Committee Report [6.2B9], the Facilities Management Self-Study [2.6H7], the Retail Operations Self-Study [2.6H5], and the Residential Services Self-Study [2.6H10]. Please see these reports for more detailed information.

Patterns of Evidence



Purposes

Developing the campus requires well-planned and well-funded capital projects, and maintaining the physical plant requires efficient and effective operations. The long-range Campus Master Plan [2.2A] provides the vision for a physical plant which supports our stated purposes. Guiding principles of this Plan include:

- minimizing current and future maintenance costs;
- maintaining architectural continuity in a campus core;
- enhancing relationships with the local community by relocating non-academic functions off-campus; and
- being accommodating to the natural environment by
 - utilizing topography to accommodate large buildings,
 - maintaining open space with views of Portage

- Lake, and
- linking buildings to provide protection from winter weather.

We interpret a facility to be something that promotes the ease of action and operation: our physical facilities are designed to promote ease of action in instruction, research, and support services through efficient operation of classroom, laboratory, housing, retail, recreational, and support facilities in a location with a challenging climate. Facilities Management is charged with the operation and maintenance of a campus which is safe, efficient, attractive, accessible, and in compliance with applicable laws, regulations, and codes. Some specific objectives of this department include:

- maintaining and upgrading aging facilities,
- adding highly specialized space,
- facilitating better utilization of existing spaces on evenings and weekends, and
- minimizing or eliminating occupational and environmental hazards.

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Resources

The University has effectively organized its human resources across several departments to develop and maintain the physical plant. Diversified sources of funding assure financial resources sufficient to support the University's purposes.

Administrative Structure

In order to deliver effective and efficient service, responsibility for developing and maintaining physical facilities is distributed across multiple departments with the use of responsibility centers, which couple program responsibility with meaningful authority over resources. These responsibility centers or units are fully empowered to accomplish their programmatic and operational missions with central support from Educational Technology Services (ETS), Telecommunications, Public Safety, Occupational Safety and Health, Energy Management, Facility Planning/Engineering/Construction, and Specialized Trades (see Facilities Management Activities Responsibilities and Cost Comparisons [4.6A]).

Facilities developed with and supported by State funding are managed and maintained by Facilities Management. These include most academic buildings with their lecture halls and classrooms. However, academic departments are responsible for equipping, operating, updating, and maintaining safety in their laboratories, learning centers, student advising space, small-group meeting and conference rooms, and associated support of departmental facilities. In addition, Facilities Management takes responsibility campus-wide for Public Safety, Occupational Safety and Health Service, Grounds Operations, and Physical Planning and Engineering. The experienced staff (93 full-time) operates with minimal supervisory personnel (3) at low cost compared to other institutions. Our staffing level is low compared to peer institutions [4.6A], but the local area has a good pool of qualified candidates.

Facilities developed with and supported by designated student fees are managed by [Retail Operations](#) (MUB—Memorial Union Building, SDC—Student Development Complex, and other athletic facilities) or [Residential Services](#) (Residence Halls, Dining Services, and University Apartments). These two units resulted from the 1995 and 1996 reorganizations of the former Auxiliary Enterprises to create more decentralized, functional, flexible, and student-driven operations. Both units rely heavily on student personnel. Retail Operations employs 90 full-time staff and 200

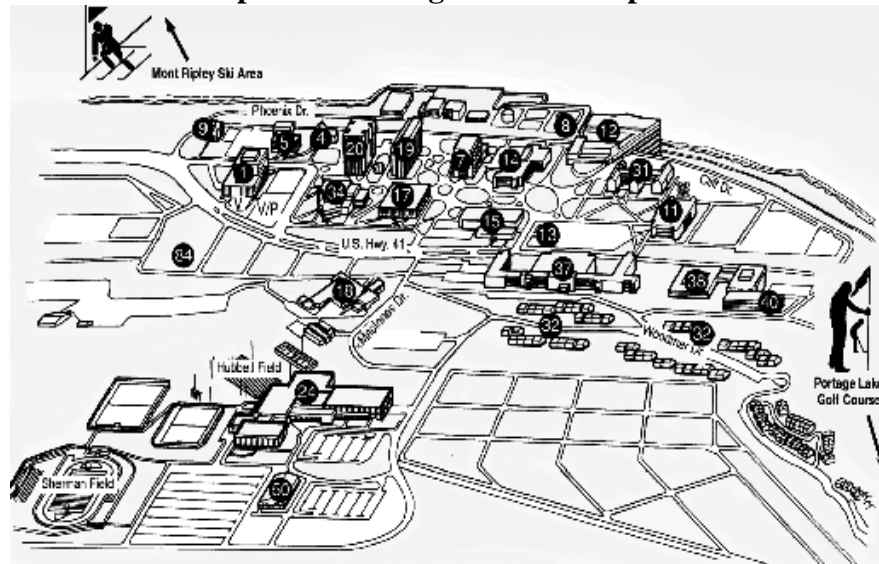
students, and Residential Services employs 110 full-time staff and 374 students. Employee teams are used to enhance decision making.

Physical Plant



Our compact 200-acre main campus (see Figure 21) consists of a central campus mall with high-rise buildings which serve most of our instructional and research purposes, and an upper campus with the Forestry Building and SDC. We operate three residence halls and a 352-unit apartment complex. Total local University facilities comprise 60 buildings on 900 acres, including an Alpine ski hill, Nordic ski trails, and an 18-hole golf course. In addition, the University owns the Ford Forestry Center in Alberta, Michigan, 40 miles south of campus, with its 4,000-acre forest and 36 buildings.

FIGURE 21. Map of the Michigan Tech Campus.



- | | |
|---|--|
| 1. Administration and Student Services Building | 17. J. R. Van Pelt Library |
| 4. ROTC Building | 18. U. J. Noblet Forestry Building (School of Forestry) |
| 5. Academic Office Building (School of Business, Social Sciences, Teacher Education) | 19. Chemical Sciences and Engineering Building (Chemical Engineering, Chemistry) |
| 7. Electrical Energy Resources Center (Electrical Engineering, School of Technology, Seaman Mineral Museum) | 20. R. L. Smith Mechanical Engineering/Engineering Mechanics Building (Biological Sciences, Clinical Laboratory Science, Mechanical Engineering) |
| 9. Alumni House/Michigan Tech Fund | 24. Student Development Complex (SDC) |
| 11. Walker Arts and Humanities Center (Liberal Arts, Scientific and Technical Communication) | 31. Douglass Houghton Hall |
| 12. Minerals and Materials Engineering Building (Metallurgical Engineering, Mining Engineering) | 32. Daniell Heights Apartments |
| 13. Hamar House Counseling Center | 34. Memorial Union Building |
| | 37. Wadsworth Hall |
| | 38. West McNair Hall |

14. Grover C. Dillman Hall (Applied Geophysics, Civil Engineering, Environmental Engineering, Geological Engineering, Geology)

15. Fisher Hall (Applied Physics, Computer Science, Mathematics, Physics)

40. East McNair Hall

50. Gates Tennis Center

P Pay Parking Lot

V Visitors' Parking Area

Facilities Decision Making



Two University standing committees—the Long-Range Capital Planning Committee and the Space Committee—participate in decision-making about developing and maintaining the physical plant. New capital acquisitions involve significant planning and oversight. The Board of Control must approve significant capital acquisitions, and the State of Michigan Department of Management and Budget as well as the Legislature's Joint Capital Outlay Subcommittee are both involved in prioritizing and funding new facilities. To assure that new facilities will serve the University's particular purposes, facility programming committees and the structure's anticipated occupants provide input into decision making from concept to completion.

Financial Resources



Diversified sources of funding assure financial resources sufficient to support the University's purposes:


- State appropriations are used for general operations,
- designated student fees are used for auxiliary capital projects and general operations, and
- State capital outlays are used for capital projects associated with instruction and research.

Significant resources provided since 1988 are discussed under "[Accomplishments](#)".

Michigan Tech uses its resources very efficiently. We have the most efficient plant operation in the State, and state and national comparisons verify we have the lowest or near lowest cost in all categories [4.6A]. Realignment of resources has allowed operations and maintenance combined expenditures for the physical plant to drop slightly from 7.2% of total University expenditures in 1988 to 6.6% in 1996 [4.6A–B].



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Accomplishments

Accomplishments can be divided into four categories:

1. academic facilities,
2. major maintenance and renewal,
3. campus life, and
4. safety.

Academic Facilities



Departmental self-studies report adequate to excellent facilities. As programs grow, Michigan Tech continues to be able to expand its academic facilities. In 1990, Paulien & Associates of Denver, Colorado, conducted a comprehensive space needs assessment [2.2D1] using guidelines set by the Western Interstate Commission on Higher Education (WICHE). They concluded that space for all colleges and schools was below the guideline values and projected a total need of 195,582 assignable square feet (ASF; see Table 18).

TABLE 18. Space Needs Analysis.

Unit	Guideline Need	Additional Space Required					Met Need Since 1988
		Classroom/Laboratory	Research	Other	Total	Percent	
College of Engineering	337,710	31,681	84,651	11,354	127,686	+61%	140,000
College of Sciences and Arts ^a	147,281	3,222	16,830	25,331 ^b	45,383	+45%	31,000
School of Business	10,177	460	2,950	241	3,651	+45%	
School of Forestry ^c	32,794	382	12,214	4,202	16,798	+80%	
School of Technology	21,321	(1,128) ^d	N/A	3,674	2,546	+14%	
Campus-wide instructional and research							29,000
Total					195,582		200,000

Assignable Square Feet (ASF) Needed by Units (Paulien & Associates) compared to ASF added since 1988

a

Excluding Physical Education (need met).

^b 20,000 ASF for the Performing Arts and Education Center.

^c Does not include the Institute for Wood Research.

^d This figure represents surplus space.

Two new facilities (Minerals and Materials Engineering Building and Dow Environmental Sciences and Engineering Building; [see Table 19](#)) and the renovation of Benedict laboratories will meet many of these needs, particularly for the Colleges of Engineering and Sciences and Arts, by dramatically increasing the quantity and also the quality of academic space. These projects added 37% to academic space, raising it from 950,000 gross square feet (GSF) to 1,300,000 GSF. This produced 200,000 ASF, thereby meeting the need projected by Paulien & Associates. The new buildings meet the vision of the Campus Master Plan for architectural continuity and accommodation to the natural environment.

TABLE 19. Capital Projects.

Project	Year	GSF	Funding		
			State	MTU	Total
Minerals and Materials Eng. Bldg.	1991	175,000	\$27	\$10	\$37
Dow Env't. Sci. and Eng. Bldg.	1998	165,000	\$30	\$14	\$44
Benedict Lab Renovation	1992		\$5		\$5
Major Maintenance and Renewal			\$2.2	\$3.1	\$5.3
Total		340,000	\$64.2	\$27.1	\$91.3

Source: Facilities Management (\$ in millions)

Michigan Tech has truly benefited from a high level of support from the State of Michigan. A Senate Fiscal Agency analysis indicated MTU received the fourth largest capital outlay appropriations in the 1980s, even though we had the second lowest enrollment of the 15 State universities. This capital outlay support has continued in the 1990s.

A new policy on student laboratory fees has improved teaching laboratories (see Chapters [3](#) and [10](#)). Student laboratory fees are now credited directly to departments that teach the laboratory courses, on a timely basis. Departments can adjust fees, subject to administrative review and approval. This allows academic departments to make multi-year plans for the replacement or upgrade of teaching equipment. As a consequence, few departments cited laboratory space or equipment as a problem in their 1996/97 self-studies.

Basic technology in support of classroom instruction is provided centrally by the [ETS](#) (Educational Technology Services, a division of Information Technology). Overhead, slide, videotape, and opaque projectors are available on request for every classroom. Because software and hardware requirements differ considerably from one

discipline to another, computer projection equipment is the responsibility of the departments. Nearly all classrooms have network connections. A few lecture halls on campus are now equipped with multimedia capabilities, funded jointly by departments and central administration. Departmental self-studies continue to report a need for multimedia classroom facilities. ETS is taking the lead in developing these classroom technology improvements.

Departmental self-studies also indicated a need for more classroom space. However, classroom utilization statistics do not support this need. Classroom utilization is only 47% of capacity with laboratories operating at 65%. The felt need for additional classrooms reflects a preference for certain locations and/or meeting times.

Major Maintenance and Renewal



In addition to funding capital projects, the State has provided \$2.2 million since 1988 specifically for major maintenance and renovation. The University has funded an additional \$3.1 million, for a total allocation of \$5.3 million. This has allowed Facilities Management to meet a major objective of maintaining and upgrading aging facilities, and to minimize the University's deferred maintenance [4.6C2].

University physical plants depreciate at a rate of 2% of replacement cost per year, based on a useful programmatic life of 25 years for most facilities. Mechanical, electrical, and architectural components of buildings represent 50% of building costs [2.6H7 and 4.6A]. Michigan Tech's calculated depreciation rate is thus \$6 million annually (\$300 million replacement cost \times 50% \div 25 years). Over 10 years, this would equal \$60 million, yet we have only invested \$24.6 million in maintenance and renewal. Even so we have minimal deferred maintenance as a result of the campus being completely rebuilt since 1960.

Campus Life



Campus life continues to be supported and enhanced by significant capital improvements and ongoing renewal and maintenance activities. Since 1988, investment in renewal of residence hall, retail, and recreational spaces totaled \$6.8 million [2.6H5 and 2.6H10]. University-sponsored housing is near capacity, yet meeting demand. Recreational activities are heavily utilized, and are an integral part of our educational system. The SDC, capable of serving 8,500 students, is in excellent condition. The SDC, Gates Tennis Center, cross-country ski trails, outdoor athletic fields, Mont Ripley Ski Area, and 18-hole Portage Lake Golf Course have all received new equipment and maintenance since 1988 [2.6H5].

In addition, we invested \$7.5 million in 1989 to renovate and expand the [MUB](#) by 30%, and \$1.7 million in 1997 for a new 12,000 ft² facility to house the Career Center, Alumni Association, and Michigan Tech Student Foundation. The Union addition was funded

by student fees and the [Meese Center](#) by private fundraising.

According to a 1996 study by the Parking Task Force [5.6D], sufficient parking is available for current needs. Parking is free for faculty, staff, and resident students; commuting students pay \$27 per year. Complaints about parking concern location, not availability, of parking. Future campus expansion will require a significant financial commitment to construct parking decks or support busing.

Accessibility on campus has been addressed in accordance with the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1991. Today, all of Michigan Tech's programs are accessible because of adherence to the new building standards and the inclusion of accessibility improvements in all remodeling efforts. The self-evaluation process prescribed by the Acts has been very helpful in directing the improvements. Snow (over 200 inches annually) continues to be the most significant barrier on campus and in our community. On the positive side, building design which responds to the Upper Peninsula's winter snowfall has all but eliminated exterior steps from our campus, which improves accessibility.

Safety



The University enjoys a relatively safe community. Nonetheless, we evaluated the role of our Public Safety Department and guided its development from a security operation to a Police Department. It has a new office, updated equipment, and a second officer on the most active shifts, and is proactive in crime prevention, community service, and education. Since 1985, we have provided emergency phones and updated all campus exterior lighting. National campus crime statistics indicate MTU has the lowest incidence of crime of Michigan universities.

MTU is a relatively safe place to work. The total recorded injury rate at MTU was 1.8 cases per 100 workers in 1995 and 1.9 in 1996. The nationwide average for universities reported by the Department of Labor's Bureau of Labor Statistics for 1995 was 3.9 cases. We have renewed our [Occupational Safety and Health](#) efforts through the active participation of the Presidential Safety Committee and the recent reassignment of the Occupational Safety and Health Director to the President. The Board of Control initiated an environmental audit in 1993 which resulted in addressing several problems, including a campus-wide clean-up of stored hazardous materials. We also eliminated airborne contaminate problems in the Chemical Sciences and Engineering Building through a major renovation of the ventilation system.



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Continuous Improvement

Capital

Unmet needs identified in the space needs assessment will be met by two planned initiatives: The Performing Arts and Education Center, which will feature a 1,200-seat performing hall and will bring great events to the campus and community, and the expansion of the Forestry Building. These projects already have State and private funding commitments and we anticipate completion by the year 2000. Expansion of the Library (see [Chapter 10](#)) as part of a new Science and Information Resource Center is slated as the next priority in our State Capital Outlay Budget Request. Future program growth and capital needs will be addressed and prioritized in the strategic planning process.

We expect a combination of State and private support to be adequate for future needs. The State of Michigan's capital outlay system has been generous, by providing a few major facilities every ten years. However, in 1996, the State required a 25% match on all capital outlay projects. We expect the State will continue to require a match on all future capital requests, which could constitute a threat to future University projects. While some uncertainty exists due to the political nature of the process, it has been reliable in the past. By anticipating capital needs, the University has organized and staffed its Advancement Office to solicit funding for capital projects in addition to equipment funding. Given our continuing growth, we are fortunate to have a strong local pool of high-quality construction contractors.

Operations



While the State provides excellent funding for capital projects, it provides little or no funding to operate new facilities. It is a significant challenge to find funding to support operations, particularly those associated with new research facilities. To date, we have succeeded in identifying new resources and realigning others, thanks to the relative autonomy of our State governance system. One consequence of realignment is the use of General Fund and auxiliary revenues to supplement growing research and graduate programs. Maintenance and renewal has been funded internally from the auxiliary maintenance reserve and State special maintenance funding

discussed earlier. However, this auxiliary reserve is now depleted, and State funding is sporadic and unreliable. New resources are needed to sustain future programmatic activities, operations, existing facility renovation and major maintenance, and to implement technology improvements in the classrooms.

Finding funds for future maintenance and renewal is critical as we cross the threshold from new low-maintenance facilities to older facilities that require a significant increase in renovation and maintenance. With a square-foot average age of 30 years, our campus has just reached the age (25–30 years) of programmatic obsolescence—the age when major maintenance costs begin to escalate. Although our facilities are now in good condition, they will demand higher levels of funding for maintenance and renewal in the future.

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Integrity

The Goal 7 Committee Report [6.2B9] indicates the University has a high level of credibility with all professionals and contractors. Relationships with State funding, enforcement, and regulating agencies are equally strong because of Michigan Tech's emphasis on long-term results and relationships.

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SWOT Analysis

The Goal 7 Committee judged that Michigan Tech has excellent, well-maintained, and well-managed facilities that adhere to the vision of the Campus Master Plan. However, funding operations of new facilities remains a challenge. Also, the physical plant is on the threshold of programmatic obsolescence and many building systems are nearing the end of their useful life—both of which will demand increasing renovation and maintenance activities in the future.

In summary, the strengths, weaknesses, opportunities, and threats with regard to the physical plant are as follows:

Internal Assessment of the Organization	
<p>Strengths</p> <ul style="list-style-type: none"> • Excellent, well-maintained facilities • Adherence to Campus Master Plan • Plant expansion • Operations management and staff • Investment in plant maintenance and renovation • Investment in equipment 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Future funding for operations and renovation • Budget realignment • 30 year old campus
	
<p>Opportunities</p> <ul style="list-style-type: none"> • State capital outlay process • Local pool of highly qualified candidates 	<p>Threats</p> <ul style="list-style-type: none"> • No State funding for new facility operations • Matching funding

- Local pool of good quality construction contractors

required for State capital outlays

External Assessment of the Environment



Action Plan

To take advantage of opportunities and remedy concerns with regard to the physical plant, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Update and follow the campus physical development plan with continued campus-wide input.	<ul style="list-style-type: none"> • Director of Facilities Management • Long-Range Capital Planning Committee
2 Prioritize proposed plant expansion, renovation, and renewal, while retaining sufficient flexibility to respond to opportunities.	<ul style="list-style-type: none"> • Long-Range Capital Planning Committee • Director of Facilities Management
3 Revise the budget process to account for indirect costs associated with new and expanding programs.	<ul style="list-style-type: none"> • Executive Vice President and Provost • Director of Budget, Planning, and Faculty Personnel
4 Establish a long-term budget for special maintenance and facility renovation. The total funding required should equal the depreciation rate of the plant.	<ul style="list-style-type: none"> • Executive Vice President and Provost • Director of Budget,

- Planning,
and Faculty
Personnel
- Director of
Facilities
Management

This Action Plan will be integrated into the strategic planning process for 1998/99.

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University Goal 8: Provide a Stable Financial Environment and Enhance Resource Acquisition

The Goal 8 Committee investigated financial management for the University as a whole. It gathered information and evaluated the manner in which the university translates the goals in its strategic plans into financial plans, insures that sufficient funds are generated to meet the University's strategic goals, and manages its financial resources in an effective and efficient manner. This chapter draws primarily on the Goal 8 Committee Report [6.2B10]. Please see this report for more detailed information.

Patterns of Evidence



Purposes

Clear, *qualitative* statements of Michigan Tech's financial goals appear in its Strategic Plan [2.1D2]. Michigan Tech is committed to

- financial stability,
- an inclusive and effective budgeting process,
- financial resource growth, and
- affordable tuition.

These goals are driven by the financial requirements of the other strategic goals and enable us to fulfill our mission.

Clear, *quantitative* statements of the University's short-term financial goals appear in its annual budgets [4.7]. These budgets clearly set out planned revenues and expenses. The Executive Vice President and Provost presents these [budgets](#) in open, public meetings to the faculty, staff, and Board of Control. Establishing and communicating our financial goals in the Strategic Plan and in annual budgets is an important accomplishment since 1988.

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Resources

Since 1991, Michigan Tech has significantly reorganized its human resources and upgraded its computing technology to ensure the efficient and effective management of the University's financial operations. The University has clearly assigned responsibility for its primary financial functions to specific, qualified individuals. It has also integrated strategic planning with budgeting to insure that campus constituencies have appropriate input into financial decision making.



Administrative Structure

Primary responsibility for the management, operation and oversight of the University's financial activities resides with eight officials of the University:

1. President;
2. Executive Vice President and Provost;
3. Senior Vice President for Advancement and University Relations;
4. Vice President for Governmental Relations and Secretary to the Board of Control;
5. Chief Financial Officer and Treasurer to the Board of Control;
6. Director of Budget, Planning, and Faculty Personnel;
7. Internal Auditor; and
8. Director of Financial Aid.

To identify qualified candidates for these important financial management positions, the University conducts position searches following guidelines in the [MTU Hiring Guide](#) [1.5B2]. The top five administrators listed above have been hired through national searches since 1990. All eight administrators have significant work experience, professional certification, and/or education that makes them well-qualified for the responsibilities that they hold.

Partly in response to financial difficulties in 1991 (discussed below), the [President](#) reorganized the upper administration (see Chapter 1, Response to [Concern 8](#)) to clearly assign responsibilities for financial matters to specific individuals. In 1991, he assigned primary responsibility for the University budget to the [Executive Vice President and Provost](#), who is

ably assisted by the Director of Budget, Planning, and Faculty Personnel. Their active and continuing role in University planning and management make them well-suited for budget responsibility. In 1992, the President created the position of [Chief Financial Officer and Treasurer](#) to the Board of Control to oversee the University's financial operations and financial reporting. This assures that management of the University's day-to-day financial operations receive the undivided attention of a qualified individual. Previously, management of the University's financial affairs were the responsibility of the Vice President for Operations and Finance, who also had responsibility for Facilities Management, Human Resources, Auxiliary Enterprises, Institute of Materials Processing, Bureau of Industrial Development, and Accounting. The Division of [Auxiliary Services](#), which reports to the Executive Vice President and Provost, is now responsible for student housing, food service, and retail operations. It was reorganized in 1995 into two units managed by a Director of Residential Services and a Director of Retail Services, for an annual budget savings of \$250,000.

The Chief Financial Officer and Treasurer to the Board of Control has dual reporting responsibilities: As Treasurer to the Board of Control, he reports directly to the Board, and as Chief Financial Office he reports to the President of the University. The [Internal Auditor](#) also reports directly to the Board of Control through the Secretary to the Board. The Internal Auditor is responsible for providing assurance that the University's accounts are accurate, expenditures are properly authorized, and that the University's business procedures are adequate. The [Goal 8 Committee](#) recommended that the Board's financial oversight would be enhanced by establishing a finance subcommittee of the Board to develop an in-depth understanding of the University's financial management and operations. This was accomplished in July 1997.

In 1996, the position of [Senior Vice President for Advancement and University Relations](#) was created to manage external fundraising. In preparation for a [\\$100 million capital campaign](#) beginning in 1998, the Senior Vice President has completely reorganized the advancement area, assisted with plans to hire college and school development officers, and hired a new Executive Director of Development and the Michigan Tech Fund. The Michigan Tech Fund, which oversees the fundraising activities and receives gifts on behalf of the University, is governed by a Board of Trustees and is audited annually by an independent accounting firm. The President also plays a major role in fundraising activities. The National Advisory Board, as well as industrial advisory boards and alumni academies instituted in the departments, colleges, and schools, provide a network of interested individuals who can be asked to assist in fundraising.

The [Director of Financial Aid](#) is responsible for managing financial-aid programs. He reports to the Executive Director of Enrollment Management, who in turn reports to the Provost. These two positions result in oversight of financial aid at the highest level.



Financial Decision-Making Process

The budget process is now integrated with the strategic planning process (see [Chapter 2](#)). This assures consistency between long-range goals and short-term resource allocation. It also invites widespread input into the budget process, which enhances the effectiveness and credibility of financial decisions. Before 1991, minimal discussion and involvement by the campus community in the budget process fed an atmosphere of mistrust of the upper administration.

The budget process begins in the fall of each year with an evaluation of current internal strengths and weaknesses and of progress toward our goals. The Executive Vice President and Provost meets with all campus units to report on last year's progress and discuss budget priorities for the coming year. All units then measure their progress toward their strategic initiatives and set new, annual goals, including a prioritized list of initiatives that would require new resources from central administration. In January, the Director of Budget, Planning, and Faculty Personnel, in consultation with the President and other senior administrators, develops a first draft of several budget scenarios for the coming year. These are shared with the campus community in multiple meetings and public forums. During the spring, the Executive Vice President and Provost and the Director of Budget, Planning, and Faculty Personnel review all of the unit initiatives and make recommendations to the President with regard to proposed funding. The final budget is normally approved by the Board of Control in June (subject to approval of a State budget by the Governor).



Physical Resources

Computing hardware and physical space are adequate for carrying out financial functions. Administrative computing relies on the BANNER® system (see [Chapter 10](#)) to process financial information. This system has generally met the University's needs in an acceptable, although not outstanding, manner. Since installation of the BANNER® finance module in 1992, significant stoppages in processing or reporting financial information have ceased, and auditors have not noted any significant problems with the system that would impair normal University operations. While the system has functioned well for most routine transaction processing, the

inability to easily modify BANNER® software has led to some problems. For example, the University has been unable to easily modify the software for optimal contract billing by research accounting (see Chapters [8](#) and [10](#)). Qualified personnel with appropriate software programming skills are needed to write, implement, and maintain software modifications which would be compatible with BANNER®.

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Accomplishments

Michigan Tech has had adequate resources over the last ten years to accomplish its mission and purposes. Although the University experienced some financial difficulties in 1991 (see below), with the exception of the temporary rescission of 1991/92 salary increases, the University has never defaulted on a financial obligation or curtailed its educational or research activities. It has succeeded in keeping its tuition affordable and has enhanced access through a comprehensive financial aid program.

Four critical resources for achieving the University's purpose of providing quality instruction are the faculty, staff, physical plant, and computing. Faculty and staff salaries and wages constitute the single largest expenditure and are the largest component of instructional costs. Although the University has yet to achieve salary parity with benchmark institutions, it is able to hire and retain qualified faculty and staff (see Chapters [6](#) and [9](#)). It also has a well-maintained physical plant, recognized as the most efficient operation in the State of Michigan, with the lowest or near-lowest cost in all categories including deferred maintenance (see [Chapter 11](#)). Student computing is supported by access and course fees, which results in excellent student computing facilities and support (see [Chapter 10](#)).



1991 Financial Difficulties

In October 1991, the State of Michigan did not make a scheduled \$4 million payment to the University for its 1991/92 appropriation. As a consequence of this action, the University laid off fifty staff, reduced salaries across-the-board by 4%, and borrowed \$4 million against its line of credit to cover its obligations. Nearly all of the laid-off staff who wished to return to the University were eventually rehired, and the debt incurred has been repaid. By June 20, 1996, the University had cash and cash equivalencies totaling \$23 million, a significant increase from the \$12 million on hand on June 30, 1988, and the \$4 million on hand on June 30, 1991.

Also in 1991, the then Vice President for Operations and Finance was making financial commitments on the basis of fund reserves which did not reflect actual cash balances. These actions, plus a transfer of \$7 million from the General Fund to the Retirement and Insurance Fund to prefund the 1980s early retirement programs, resulted in a \$7,866,000 General Fund deficit. The University has eliminated this deficit and has a positive general fund balance of \$1,915,000 as of June 30, 1997.

One response to the 1991 financial difficulties was a complete reorganization of University financial operations (discussed above). Duties of the former Vice President for Operations and Finance were divided between the Executive Vice President and Provost and the Chief Financial Officer. Another response was improved financial management processes: A cash flow projection model to aid in the prediction and management of cash flows, quarterly financial statements, and a participative budgeting process (discussed above) to aid in the timely identification of actual or potential problems.



ESI/Ventures

A detailed discussion of ESI (the Educational Support Institute) and Michigan Tech Ventures, Inc. (hereafter referred to as "Ventures") is contained in the Lewiston Report [5.6A]. A brief overview of the relevant issues is provided here.

In the early to mid 1980s, the Michigan Tech Board of Control authorized the establishment of ESI and Ventures. In order to separate the management and operations of Ventures from the University, ESI was established, and ownership of Ventures was transferred from the University to ESI, making Ventures a wholly-owned subsidiary of ESI. These two organizations had three purposes: to benefit Michigan Tech by facilitating "the transfer of technology from the laboratory into the business world" [5.6A, p.3], to support the University's research and development activities, and to facilitate regional economic development. These purposes were laudable and several job-creating initiatives were successful. In particular, ESI/Ventures facilitated regional economic growth and job creation through aiding start-up or financially troubled companies such as Peninsula Copper and Main Street Inn (now Best Western - Franklin Square).

In 1990 and 1991, ESI and Ventures were named as defendants in several civil lawsuits that alleged nonpayment of debts. Shortly thereafter, two of Ventures' top officers pleaded no contest to tax evasion and the dissolution of ESI and Ventures began. As of June 1997, the dissolution is substantially complete, although ESI and Ventures both remain in existence pending final completion of their legal and business affairs.

The net effect of ESI/Ventures on the University was threefold: the loss of an indeterminate amount of assets that were transferred to Ventures, a tarnishing of MTU's reputation, and impairment of the University's ability to engage in profitable technology transfer. In particular, the ESI/Ventures events have impaired University fundraising efforts due to a perceived lack of integrity on its part. Fortunately, as ESI is a separate legal entity, the University should not be liable for any unpaid debts or obligations of ESI/Ventures.

While it is not within the University's power to institute policies that would prevent a similar series of events from occurring in the future,

it is unlikely that similar incidents will occur in the future. The Board of Control has a heightened awareness of the need for effective financial management and control. Further, the University's counsel now attends all Board meetings to provide independent advice on Board actions, something that did not occur before 1991.



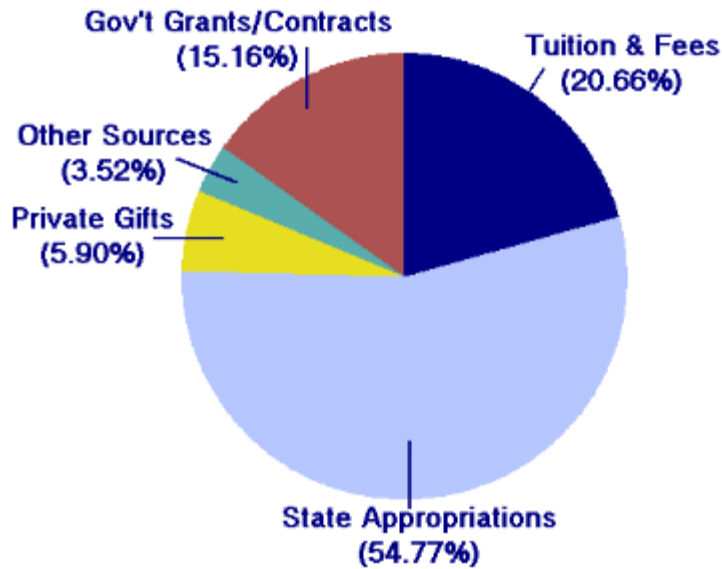
Current Funds Revenue and Expenditures

Revenues from tuition, State appropriations, and research grants have grown annually since 1988 (see [Table 20](#)). This has enabled Michigan Tech to maintain the high quality of its educational programs. Like most public institutions of higher education, MTU has successfully developed diverse sources of revenue, which include tuition and fees, sponsored research, and private gifts, instead of relying predominantly on State appropriations. For a comparison of revenue sources in 1988 and 1996, see [Figure 22](#) and [Figure 23](#). Although annual State appropriations to MTU have grown by 23.5% since 1988, from \$34.9 million to \$43.1 million in 1996, they now provide only 40% of current funds revenues, compared to 55% in 1988. Even so, at \$7,416 per capita State funding in 1996/97, Michigan Tech is in the top tier of State-supported institutions in Michigan. In 1996/97, we received a 4% increase, plus a \$927,000 supplement for technology-related expenditures in recognition of our high cost science and engineering curriculum. Another 4% increase was received in 1997/98.

[Tuition](#) provides the second largest source of revenue. Michigan Tech is committed to maintaining tuition at affordable levels. Our resident tuition and fees (\$3,948) are low compared to upper-division tuition and fees at other Michigan research universities (University of Michigan is \$6,438; Michigan State University is \$5,306). Nonresident tuition of \$9,231 is also competitive. One measure of affordability is our ranking by *Money Magazine* in 1996 as one of the ten best buys among scientific and technological universities and one of the top fifty "best values" among national universities by *U.S. News & World Report*. Fluctuating [undergraduate enrollments](#) since 1988 (see [Figure 10](#) in Chapter 4 and Response to [Concern 9](#) in Chapter 1) have negatively impacted tuition revenue and impaired our ability to meet all of our goals. Declining enrollments since 1993 have created concern across campus and led to several initiatives to try to reverse this trend (see [Chapter 4](#)). Because we have purposefully kept tuition and fees low, there may be potential for increasing tuition and fees to raise revenues.

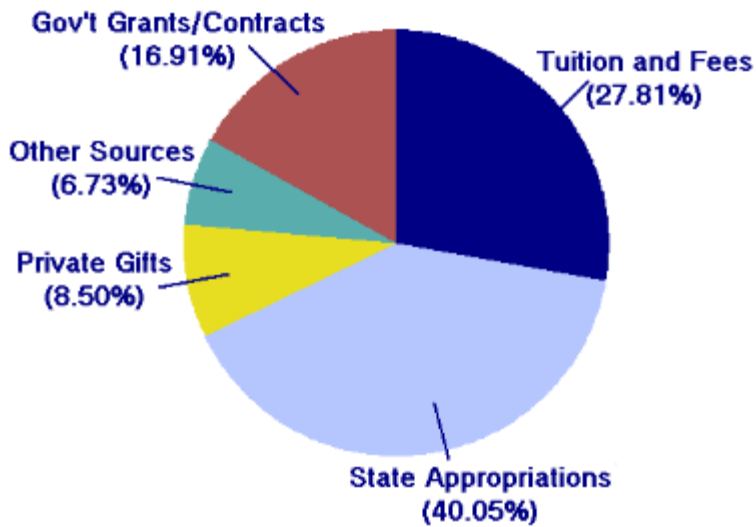
[TABLE 20. Current Fund Revenues](#)

FIGURE 22. Current Fund Revenues: 1987/88.



Source: IPEDS Finance Surveys

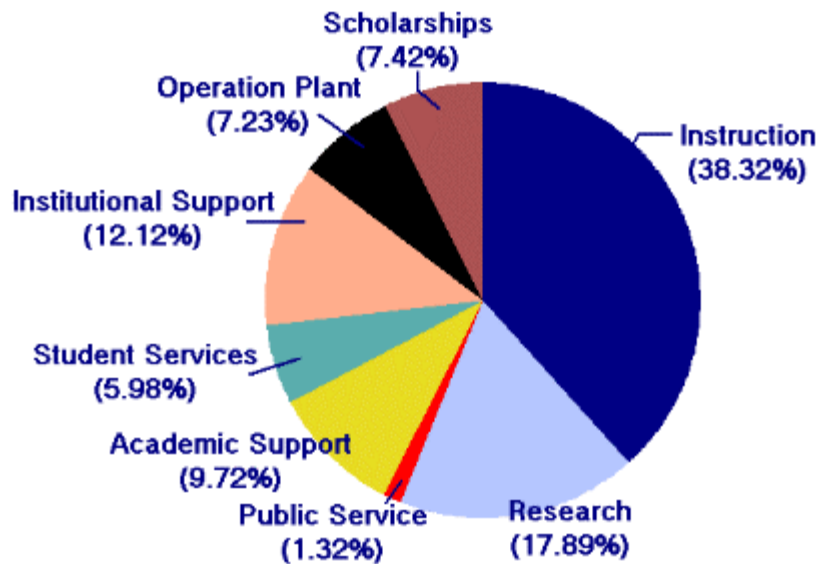
FIGURE 23. Current Fund Revenues: 1995/96



Source: IPEDS Finance Survey

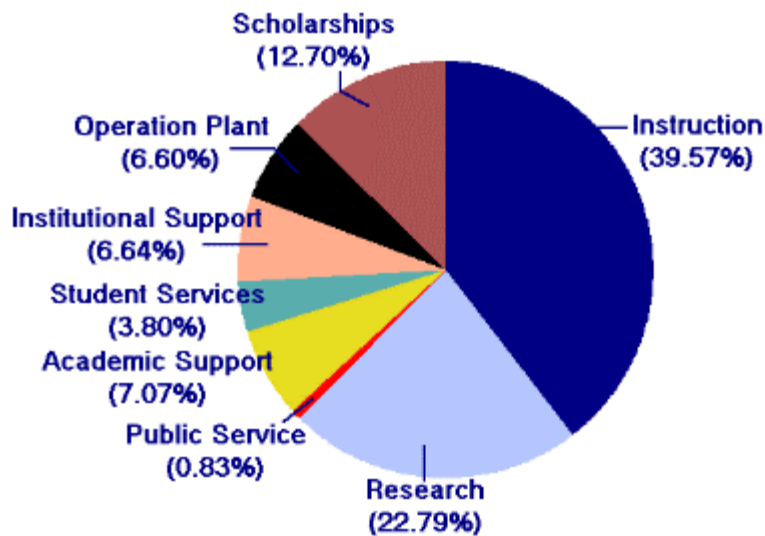
TABLE 21. Current Fund Expenditures

FIGURE 24. Current Fund Expenditures: 1987/88



Source: IPEDS Finance Survey

FIGURE 25. Current Fund Expenditures: 1995/96



Source: IPEDS Finance Survey

Related to tuition revenue is University expenditure on [financial aid](#). Approximately 63% of Michigan Tech's students receive financial support, totaling \$36.3 million annually. The University administers a comprehensive financial aid program that includes scholarships, grants, loans, and part-time employment. Financial aid is one of the tools to keep Michigan Tech education affordable for all students.

As we increase our graduate programs, we also look to increase external funding for research. Since 1988 annual sponsored research has increased 85% from \$11.3 million to \$20.9 million in 1996. We

expend over \$5 million per year to support graduate students and have made significant improvements in the physical facilities to support research (see Chapters [3](#) and [4](#)).

Auxiliary Operations—Residential Services and Retail Operations—generate approximately \$18 million annually in revenue, but expenditures equal about 90% of revenues. Auxiliary Operations thus does not represent a significant source of funds for core educational functions.

The Michigan Tech Fund is instrumental in generating new resources for the University through gifts and grants. More alumni involvement and increased solicitations have grown the Fund's assets fourfold since 1988, from \$10.7 to \$45.7 million in 1996. As a result, funds provided to the University for student scholarships and faculty development have more than doubled since 1988, to \$1.2 million for each in 1996. Corporate support in the form of gifts, grants, and research funding has grown by 78% to \$6.9 million in 1996. Major gifts since 1994 include \$5 million from the Dow Foundation; \$2.5 million from a private donor; and \$1 million from the Ford Motor Company Fund in support of the Environmental Sciences and Engineering Building.



Other Indicators of Financial Condition

In 1995, our liquidity improved by \$1.1 million over 1994. The University has periodically obtained short-term financing from Michigan Financial Corporation and has a \$10 million line of credit from that institution.

In 1993 Michigan Technological University received a Moody's bond rating of "Aaa" and Standard and Poor's rating of "AAA" These excellent ratings reflect our success in meeting financial obligations. The University has debt of \$3,070,000, the lowest of any public university in the State of Michigan. This represents \$497 of debt per FTE student. This compares very well with Grand Valley University, which has the next largest total debt of \$15,157,000 or \$1,475 per FTE, and the University of Michigan—Ann Arbor, at \$621,288,000 or \$13,748 per FTE, the highest debtor.

Arthur Anderson, LLP, our external auditor, has given Michigan Tech an unqualified opinion on its financial statements for each of the past eight years. If, in the auditors' opinion, there is substantial doubt about the university's ability to continue as a going-concern for a reasonable period of time, they should issue an unqualified audit report with an explanatory paragraph to explain the nature of the university's going-concern problems and uncertainties.



Operating Efficiencies

After salaries and wages, employee fringe benefits are the University's second largest expense. In an effort to control future

costs, a Benefits Long-Range Plan was developed in 1995. Several initiatives have already been implemented to provide quality services at a reasonable cost: PPO network for delivering health care, a flexible benefits program (Tech Select), and a wellness program with a full-time coordinator. The former defined benefit retiree health care plan (estimated liability of \$107,000,000) is being replaced with a defined-contribution plan (estimated liability of \$6,000,000).

When President Tompkins arrived in 1991, he launched a total-quality initiative which included hiring a Manager of Quality Service Education. Operating efficiencies that resulted from the TQE initiative have been recognized in student recruiting and registration, scheduling, advancement, and the SDC (Student Development Complex) (see [Chapter 9](#)).



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Continuous Improvement

Current revenue streams and future funding from new sources should provide sufficient funding to support University operations. While it is unlikely that the University will experience any significant financial difficulties in the near future, it has set a number of ambitious goals which will depend on significant increases in revenue from multiple sources. The University is moving aggressively to increase the funding it receives from its three main sources—State appropriations, tuition, and sponsored research—and is embarking on a \$100 million capital campaign. Since the 1991 financial difficulties, the University has taken several steps to insure financial mismanagement will not lead to future difficulties.



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Current Sources of Revenue: State Appropriations, Tuition, Sponsored Research, and Private Gifts

Although increases in State appropriations have been moderate, they have been reliable, and we anticipate this will continue.

In 1996/7, the State of Michigan began to establish per student "floor funding" levels (minimum per-student funding levels) for universities, based on Carnegie classifications (see [Table 1](#), Chapter 1). Michigan Tech is currently classified Doctoral II, although we have achieved the threshold for Doctoral I status. Attainment of Research II classification within the next five years is highly likely, and would make us eligible for additional funding. In addition to regular line-item appropriations, the State also funds capital projects; however, the State now requires matching funds for them (see [Chapter 11](#)).

The University has been working to educate State officials about the high cost of science and engineering education. President Tompkins' election to the presidency of the Michigan Presidents' Council, an organization composed of the presidents of Michigan's 15 State-supported universities, supports this. Two unpredictable factors which may impact State support in the future are

1. the extent to which the State requires public universities to help fund the unfunded portion of the MPSERS (Michigan Public School Employees Retirement Systems) fund, and
2. settlement of the Durant case which could require the State to fund all Federal and state unfunded mandates for K–12 education—this could place significant pressures on the State budget (initial estimates indicate that the cost could be in excess of \$300 million per year).

Because affordable tuition is a University objective and because Public Act 7 provides a tax credit to parents of students who attend universities that limit tuition increases to the level of inflation, it is unlikely that the Board will recommend significant increases in tuition rates to generate revenue. Instead of looking to increase the tuition rates, the University is acting to attract and retain students (see [Chapter 4](#)) to increase total tuition revenue. Enrollment is projected to increase in 1998/99. When we achieve our stated goal of 7,100–7,300 students, we would realize annual additional revenue from tuition of \$3–4 million.

We now distribute a large portion of our financial aid based solely on academic qualification and financial need. Financial aid could be used preferentially as a tool to improve enrollment in under-enrolled programs.

Although Federal funding for research has been significantly constrained in recent years, we have been able to obtain an increasing number of dollars from sponsored research, a trend we anticipate will continue. The role of research in the tenure and promotion process, and support supplied for research (see [Chapter 8](#)), are significant and continuing institutional incentives. Nonetheless, declines in federal funding coupled with a reluctance to fund indirect costs pose threats to our ability to support research at a level consistent with our strategic plan.

The past success of the Michigan Tech Fund, as well as the connections provided by the many industrial advisory boards and alumni academies, position Michigan Tech for future advancement efforts. To aid in the upcoming capital campaign, we hired an outside consulting firm, which determined that the University was not yet in a position to begin a major capital campaign. The consultants' recommendations have been incorporated into Advancement's long-range planning to guide future fundraising activities. While the capital campaign should provide the funding required for planned capital improvements, it is unlikely that operating funds will be enhanced by external fundraising, with the possible exception of tuition scholarships.

Factors That May Enhance Future Revenue

Better marketing, improved residence facilities, and an improved intellectual properties office position the University to generate new revenue in the future. Michigan Tech is developing a comprehensive marketing plan to enhance our image (see [Chapter 4](#)), which should result in higher enrollments and increased levels of giving. Income from auxiliaries is expected to increase as residence halls and student apartments return to full occupancy in Fall 1997/98. With no debt service on these facilities, improved occupancy from a larger incoming freshmen class and a higher re-application rate, attributable to improved residence-life programming and lifestyle options, contribute directly to the University budget. Finally, as our research grows, opportunities for patents and licenses increase and the resulting revenue could be substantial. Trademarks and licensing are also potential growth areas and the University image and icons will be marketed more aggressively than in the past.



Financial Planning

All organizations periodically realign resources to remain viable in a changing environment. Since 1993/94, realignment at Michigan Tech has been accomplished by reducing the total base budget for each unit by 1% each year (see Chapter 1, Response to [Concern 3](#)). The administration allocated these captured funds to fund new initiatives such as pursuing accreditation for the School of Business and Economics. However, an unintended consequence of realignment has been the depletion of available funds for SS&E (Supplies, Services, and Equipment). In response to the Board's concern that we reallocate resources, we will be implementing a pilot position control program. After July 1, 1997, any vacant positions will revert to the Provost, and be dealt with on a case-by-case basis. To resolve the problem with depleted SS&E budgets, in 1997/98 these budgets will increase by 4% across the board.

A weakness in our financial planning is that not all strategic financial goals have been quantified. For example, one goal is for student tuition and fees to increase at a "modest" rate, yet there is no definition of "modest" nor any goal for total tuition revenue. This is also true for State appropriations, fundraising, and savings from enhanced operating efficiency. Another weakness is that we have not yet translated our strategic financial goals into long-range budgets which look more than three years into the future. Assessing and clearly stating our goals in terms of future revenue streams and expenditures will help us accomplish the University's ambitious strategic objectives.

Although the University is prepared for short-term financial shortfalls, with its \$10 million line of credit, it has not anticipated or planned for events, such as permanent cutbacks in the State funding or large unplanned costs, that would create long-term financial problems. The University Senate has yet to propose a retrenchment plan. The danger is that, given the 1991 financial difficulties, any efforts in this direction may be misinterpreted as symptoms of another financial crisis. However, the University's current solid financial position provides an opportunity to develop a strategy and operating plan for dealing with financial problems in a non-crisis atmosphere where all affected constituencies may be heard.



Integrity

The University demonstrates integrity in its financial relationships through a system of internal controls, full and truthful disclosure of its financial position in publicly available audited financial reports, and policies and procedures which ensure ethical conduct. Specific policies and procedures are in place for acceptance of gifts and distribution of financial aid.

Michigan Tech's internal and external auditors' reports indicate that the University's internal control system is well-designed and functioning properly to safeguard University assets and to fully and accurately record, summarize, and report financial transactions (including transfers between funds). Monthly forecasts and monthly and quarterly reports are prepared in addition to annual, audited financial statements. Established University policies guide the transfer of funds between fund accounts, purchase of large capital items, investment of capital, and budget accountability. Investments are restricted to specific investment criteria and vehicles; an external, independent money manager manages these investments and reports to the Board of Control at least annually.

The Chief Financial Officer, the Board of Control, and the University Senate are all charged with general financial oversight. The [Chief Financial Officer](#) monitors compliance with the University's budget and has the authority to take preventive and corrective action, which includes prohibiting a unit's expenditure of funds in excess of its budget. He reports bimonthly to the Board on the University's financial status; minutes of these meetings are publicly available in the library [3.2B]. The Board of Control must approve the annual University budget as well as significant capital acquisitions and financial obligations such as the issuance of bonds. The Finance Committee of the University Senate is charged with reviewing the financial status of the University, and in

particular whether University investments adhere to investment guidelines. The Senate President reports on Senate activities at every Board meeting.

The University fully and truthfully discloses the results of its operations and its financial position in its externally audited annual report, which includes the published audit opinion. The annual report is publicly available. In addition, the University prepares Combined Annual Financial Report Financial Statements in the State's consolidated format. Because Michigan Tech has an independent Board of Control, it enjoys relative autonomy from detailed State financial control, compared to more centralized systems of public higher education in neighboring states.

Additional audits to insure financial integrity include:

- audits by the [Internal Auditor](#), who reports regularly to the Board;
- periodic [audits by the State of Michigan](#);
- [NCAA](#) financial audit of intercollegiate sports every three years; and
- periodic [U. S. Department of Health and Human Services](#) audits of sponsored research.

The Internal Auditor submits an annual audit plan that guides its audit activities. Internal Audit reviews actual practices against policy to ensure that University policy is being carried out correctly, and that each area is using fiscally sound procedures. The audit reports highlight findings, departmental responses, and recommendations for improvements. However, in the past the University had no mechanism in place to follow up to ensure that incorrect financial procedures were corrected. During the past year, Internal Audit began follow-up audits on prior recommendations. This has provided an incentive for departments to correct any practices that are not fiscally sound.

The University's Conflict of Interest Policy [1.2A] requires individuals to disclose conflicts that arise from outside professional activities, commitment of effort, external professional relationships, outside business activities, and other outside professional activities to a Conflict of Interest Coordinator who determines the degree of disclosure required for these activities. Due to the complexity of this issue, the University is working on establishing procedures to help individuals know how and when to disclose potential conflicts and how to ensure that these potential conflicts do not put the University at risk.

In response to growth in private gifts, and anticipating the upcoming capital campaign, the Michigan Tech Fund has developed procedures over the past few years with regard to donor solicitation, the acceptance of gifts, the valuation of

gifts, control and appraisal of assets, and the environmental assessment of properties. The Michigan Tech Fund is audited separately by independent auditors at the direction of the Michigan Tech Fund Board of Trustees (the Tech Fund Board includes two Board of Control members as liaisons), but its financial reports are not reviewed by the University's Internal Auditor.

Financial aid programs are governed by policies and procedures established by the University, the State of Michigan, and the Federal government.



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Financial Environment

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SWOT Analysis

Based on its review of relevant documentation, the Goal 8 Committee determined that the University successfully translates its strategic goals into short-range financial plans, has sufficient and continuing funding to meet those goals, and manages its financial resources in an effective and efficient manner. It therefore provides a stable financial environment. Major sources of funding are stable or growing. There is some concern, however, about the erosion of tuition revenue due to declining enrollments.

In summary, the strengths, weaknesses, opportunities, and threats with regard to the financial environment are as follows:

Internal Assessment of the Organization

Strengths

- Funded by State at higher level than comprehensive institutions
- Affordable tuition
- Strong financial position of limited indebtedness
- Competent financial managers
- Growth in sponsored research and gifts
- Reorganization of Advancement
- Low maintenance for facilities and no deferred maintenance
- Relative autonomy from detailed State financial control

Weaknesses

- High-cost science and technology programs
- Declining enrollment = declining tuition and fees
- No retrenchment plan
- No long-term, comprehensive financial plan



SWOT ANALYSIS

Opportunities

- Healthy State and national economy
- Formula funding pegged to Carnegie classification
- Significant base of successful alumni

Threats

- State constraints on tuition increases
- Reduction in State funding pending outcomes of MPSERS and Durant cases
- Continued decline in Federal support for basic research
- Reluctance to fully fund indirect cost recovery for sponsored research

External Assessment of the Environment

Action Plan



To take advantage of opportunities and remedy concerns with regard to the financial environment, the following action plan is recommended. Responsible parties for implementing the recommendations are identified.

What	Who
1 Develop 10-year operating and capital-outlay budgets.	<ul style="list-style-type: none"> • Executive Vice President and Provost • Director of Budget, Planning, and Faculty Personnel
2 Form a Board of Control Finance Subcommittee.	<ul style="list-style-type: none"> • Board of Control (completed July 1997)
3 Develop a retrenchment plan.	<ul style="list-style-type: none"> • University Senate
Hire or train staff to	<ul style="list-style-type: none"> • Vice Provost for

4 modify BANNER®
finance module.

Information
Technology

5 Use student major as factor
in allocating financial aid.

- Board of Control
- Director of Financial Aid

This Action Plan will be integrated into the strategic planning process for 1998/99.

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Request for Institutional Change

We request a change in the Statement of Affiliation Status to allow Michigan Tech to offer degree programs at new sites. This proposed change falls under the Commission's policies on "new degree sites" [6.1D, p. 136]. For maximum flexibility in our offerings, we request the change to read: "No prior Commission approval required for offering courses and degree programs at new sites."

Reasons for Institutional Change

Michigan Tech's corporate partners, which include both global corporations and professional societies, want to offer their employees and members opportunities for life-long learning. In particular, they want to provide them access to Michigan Tech's quality educational programs. These partners are located at a considerable distance from Michigan Tech, often in multiple locations around the State, nation, and globe. Demanding work schedules of full-time employees, compounded by family obligations, require a flexible learning environment that our residential programs, which require multiple weekly on-site class meetings and laboratory sessions, cannot offer.

To respond to our corporate partners' requests, Michigan Tech decided to offer existing degree programs via distance delivery to sites requested by these partners. These sites could be in Michigan, or at national or international locations. Currently, we offer three programs, for which we are now asking NCA approval:

1. a Bachelor of Science in Engineering (BSE) degree with a concentration in Mechanical Design,
2. a Bachelor of Science in Surveying (BSS), and
3. a PhD in Mechanical Engineering/Engineering Mechanics.

Offering distance delivery of our science and engineering programs improves our ability to fulfill our legislative

mandate and mission to promote the welfare of the industries of the State by providing highly qualified graduates (see [Chapter 2](#)). Several of our partners are international corporations which require seamless access to quality educational opportunities for their global workforce. Improvements in technology for distance delivery (see "[Physical Resources](#)" below) and the growing demand for continuing education of a worldwide workforce combine to make distance delivery a logical development for Michigan Tech.

Distance delivery of existing programs grows directly out of institutional strengths and was anticipated by the 1988 NCA Evaluation Team. In its report, the Team noted that Michigan Tech's College of Engineering was in transition and expected that enhanced interaction with industry would occur "in the context of extending and maintaining what MTU already does exceptionally well, namely undergraduate engineering education" [6.1A, p. 34]. The Team also noted the growing interest in Michigan in "increased availability of graduate education through television networking" and that "such televised education supports the mission of the University to make technological education available..." [6.1A, p. 62]. The Team expressed a concern, however, that the demands on faculty to participate could interfere with the on-campus mission of teaching and research. To address this concern, procedures for monitoring and controlling faculty workloads associated with distance delivery have been developed (see "[Human Resources](#)" below).

Planning for Institutional Change



Several planning documents identified distance delivery of education as a way to meet our purposes:

- The 1975 Long Range Planning *Committee C Report* [2.1A] recommended the development of academic programs to supplement and update professional skills.
- The 1992 vision statement [2.1D2] called for "more education for students, using nontraditional methods of delivery and development (distance learning)."
- The 1995 Strategic Plan [2.1D2] called for the University to "promote...distance learning opportunities throughout the year."

These documents provide the institutional foundation for developing distance education programs at Michigan Tech.

Distance delivery at Michigan Tech is based on the specific needs of established corporate partners. A needs analysis is performed when a partner identifies and defines a need for

distance education. The BSS is offered at multiple sites in Michigan in response to needs identified by the Michigan Society of Professional Surveyors (MSPS). The BSE with a concentration in Mechanical Design and the PhD in Mechanical Engineering/Engineering Mechanics are offered by the College of Engineering at specific corporate locations in response to specific corporate requests. These programs are described in more detail in the next section.

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Distance Education Programs

Michigan Tech's distance education mission is to provide access to its quality on-campus learning opportunities. MTU achieves this mission not by designing distance education degrees, but by designing access mechanisms that integrate the place-bound student into the university-based student population while maximizing value to its corporate partners.

Distance education is defined as a formal educational process in which the majority of the instruction occurs when student and instructor are not in the same location. Instruction may be synchronous or asynchronous and employ correspondence study or audio, video, or computer technologies. Our programs are primarily asynchronous: faculty prepare videotaped lectures which are viewed by students, and students then interact with faculty and other students by phone, fax, and e-mail at their convenience. Increased use of the internet and WWW for course delivery is anticipated for the future.

Distance education at Michigan Tech is the product of several groups who work together. Faculty develop the distance education program to ensure its academic quality. Academic support units such as the Library, Admissions, Information Technology, and Financial Aid ensure that students have access to on-campus resources. Finally, Extended University Programs (EUP) staff have administrative responsibility for distance education, coordinating the delivery of distance education and also making marketing materials available to corporate partners to assist in their internal marketing of MTU distance-education courses to potential students [9.5A].

Successful distance education requires a good infrastructure. Michigan Tech and its partners have established an infrastructure to support administration, production, faculty, and student advising.

- *Extended University Programs* provides administrative support to help enroll students, collect fees, mail video tapes, send out instructional materials and books to students, market the programs, assist faculty, and perform other administrative and support functions as necessary [9.6] EUP maintains a WWW site [<http://www.admin.mtu.edu/eup/>] and has prepared *Teaching at a Distance: Faculty Handbook* [9.1C] to assist faculty responsible for distance education instruction.
- *Educational Technology Services* (ETS) manages the production studio where on-campus class lectures are

- videotaped for off-campus students.
- *Site Coordinators* employed by the corporate partner interact closely with the EUP Student Services Coordinator. Site coordinators perform daily and quarterly administrative duties such as distributing videotaped and printed course materials, collecting and forwarding student homework and projects, proctoring exams, returning graded exams, returning videotapes, and making special arrangements when students cannot attend class [9.1B].

For additional information on EUP and ETS staff, see "[Human Resources](#)" below.

The equivalence of on-campus and off-campus programs, and the integrity of distance education, are assured in several ways:

1. *Equivalent Admission Standards.* Academic advisors, who advise both on- and off-campus students, evaluate transcripts with the aid of the University Transfer Counselor.
2. *Equivalent Courses.* There is no distance education catalog with unique distance education courses; courses offered by distance technology are the courses listed in the *Undergraduate Catalog* [1.3A]. On-campus classes are held in the studio during taping, so off-campus students receive the same lectures as on-campus students. Curricular issues are the responsibility of faculty members or committees in the degree granting programs.
3. *Access to Learning Resources.* An EUP Student Services Coordinator facilitates communication between off-campus students and faculty, academic advisors, and other campus resources normally available to on-campus students, including admissions, registration, financial aid, advising, degree audit, library, learning centers, career center, and bookstore. Procedures used by the Student Services Coordinator to integrate the place-bound student into the university-based student population are outlined in supporting documentation for distance education [9.2H]. EUP has prepared the *MTU Distance Learning Student Handbook* [9.1A] which is available in print and on the EUP WWW page. The Distance Education Technology Help Desk, accessible by e-mail, phone, fax, voice mail, and walk-in hours, provides assistance with electronic services and computer requirements to students and faculty and electronic distribution of distance education course information. EUP is also creating a student orientation tape to help in technology use questions. See also "[Instructional Resources](#)" below.
4. *Adherence to University Policies.* Faculty eligibility to teach courses, adjunct appointments, and other academic and administrative procedures such as conflict of interest are applied equally to on- and off-campus programs.

The [BSS](#) is offered through distance delivery by the School of Technology as a response to a specific need of the MSPS. Surveyors are now required to earn a BSS in order to be licensed in Michigan. Because the demand for graduates in this field is great, MSPS wanted to provide its membership access to Michigan Tech's BSS. Accordingly, MSPS and the University conducted a continuing education needs assessment of the MSPS membership, which sought information on the members' current educational status, their educational needs, and time and place limitations on pursuing additional education. Based on this assessment, MSPS and Michigan Tech decided to offer a distance degree program to individual students at multiple sites throughout Michigan, with Macomb Community College as its initial access site. This program is now offered at eight corporate sites. Fall 1997 enrollment is 40 students.

Because [Macomb Community College](#) (MCC) offers an associate degree in Surveying, it was originally agreed that MTU would offer upper-division surveying classes while MCC would offer lower division classes. Over time, this MTU-MCC partnership has weakened as Michigan Tech expanded beyond the region served by MCC. MSPS has inquired about the possibility of MTU offering lower division classes. Faculty will take this inquiry under consideration during the current academic year. Before offering lower division classes, we need to do extensive planning.

Bachelor of Science in Engineering with a concentration in Mechanical Design



The BSE is offered through distance delivery by the College of Engineering, with major courses and academic advising provided by Mechanical Engineering/Engineering Mechanics. This program is currently offered only to General Motors Corporation in metropolitan Detroit. Approximately 40 students are enrolled and ten are expected to graduate in November 1997.

The curriculum emphasizes design and strong computer and laboratory experiences. The laboratory component of courses with experimental and computer laboratories are developed according to guidelines established by our faculty with input from corporate partners [9.2G, *General Motors Technical Education Program (TEP) Quality Standard for Laboratory Selection and Set-up*] and are taught at university, industrial, and community college sites in metropolitan Detroit by adjunct faculty under the direction of a Michigan Tech faculty member. Adjunct faculty are selected through normal University procedures for an adjunct appointment and are

only utilized for laboratory components of coursework. Of the total of 196 credits required for the BSE, a minimum of 45 credits of 300- and 400-level course work must be taken from Michigan Tech, which include specific courses that contain required engineering design content.

PhD in Mechanical Engineering/Engineering Mechanics



The PhD in Mechanical Engineering/Engineering Mechanics is offered off-campus by the College of Engineering, with major coursework and academic advising provided by the Departments of Mechanical Engineering/Engineering Mechanics and Electrical Engineering. This program is currently offered only to Ford Motor Company employees; four students have been admitted to the program and one is under consideration. The off-campus PhD is administered under our existing PhD program through a waiver of the residency requirements by the Vice Provost for Research and Dean of the Graduate School. A committee of the Graduate Council is reviewing distance education programs to make a recommendation on policy for distance education graduate programs to the Graduate Council and Dean of the Graduate School. If recommended, the Dean would bring this policy to the University Senate for its approval.

The off-campus PhD focuses on educating technical experts in areas of specific interest to our corporate partner. Admission to the program is handled on a case-by-case basis. Upon admittance, the PhD candidate establishes a doctoral advisory committee and defines a research project directed toward the research needs and applications of the sponsoring corporate partner. The committee consists of at least two Michigan Tech graduate faculty, and one or two adjunct professors appointed from the sponsoring corporate partner. The student's doctoral advisory committee may be chaired either by the major Michigan Tech faculty advisor, or by co-chairs from the University and the sponsoring corporate partner. Adjunct faculty are selected through normal University procedures for an adjunct appointment, which requires proof of qualifications.

Because a key element of a PhD program is the direct interaction between the student and his/her faculty advisor, the Michigan Tech faculty advisor will normally spend three to six months in residence at the corporate partner's site advising and directing the doctoral student's research. The doctoral student will spend approximately two weeks in residence at the University for each of the qualifying, comprehensive, and final doctoral dissertation defense examinations. In addition to the successful completion of these examinations, a minimum of thirty (30) quarter credits

of graduate courses beyond the MS degree is required. The majority of these courses will be offered via videotape. All doctoral students must maintain a continuing enrollment of at least six credits per quarter (course and/or research), three credits of which must be taken from Michigan Tech.

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Approvals

Because the programs and courses offered by distance delivery are established on-campus courses, they are already approved. Development of degree programs for off-campus delivery involves extensive communication with, and approval by, faculty and academic administration. This includes approval by the University Senate and, as needed, the MTU Board of Control [9.2F].

Contractual arrangements with corporate partners are subject to established procedures and internal approvals of contracts and agreements [9.2A]. Delivery of courses and existing degree programs by distance education within Michigan does not require external approval by any higher education agency in Michigan. Approval for delivery of courses in other states is attained as required from their higher education agencies; notification to NCA of such approvals will be provided as received.

Effects of Institutional Change on the University

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Because the proposed change addresses only the delivery methods and potentially global delivery sites for existing programs, no negative impact on Michigan Tech's continued ability to meet the GIRs or Criteria for Accreditation is anticipated.

Distance delivery to global corporate partners has the following effects on the institution:

- *Faculty Workload.* Courses are normally delivered to both on-campus and distance education students during the same term and by the same instructor. Faculty teach distance education courses on an overload basis for extra compensation [9.2B, Faculty Compensation Procedure]. For courses with large distance education enrollments (over 20 students), we are exploring the possibility of providing a teaching assistant to assist with grading and material preparation.
- *Faculty Development.* EUP provides faculty with technical assistance in instructional design and

technology, which includes workshops and practice sessions which explore technology options to enhance effective teaching. Skills acquired in creative course design and use of technology will enhance on-campus delivery as well as off-campus offerings [9.1C, *Teaching at a Distance: Faculty Handbook*, and 9.4A, *Course Guidebooks*].

- *Curriculum Enhancement*. Delivery of courses and programs to employees of global corporate partners facilitates networking and development of up-to-date case studies, design projects, and new courses based on real-world issues and problems.
- *Student Assistance*. Videotaped lectures prepared for distance education are increasingly being used by on-campus students for review and study purposes.

Assessment and Continuous Quality Improvement



Because all distance education programs are already offered on-campus, distance delivery of these programs uses processes and procedures already in place for on-campus delivery of courses and programs. Established decision making processes for course and program development and program review procedures including assessment of student academic achievement are used to ensure academic quality and integrity. A special course evaluation process has been developed and is completed by students and faculty in all distance education courses. Students evaluate the course, the instructor, and the distance education staff [9.3A]. In addition, corporate partners frequently perform their own course and faculty evaluations and share these with distance education staff [9.3B]. EUP is responsible for monitoring teaching evaluation of faculty [9.2C]. EUP staff review results individually with participating faculty members.

The *MTU Distance Education Student Handbook* [9.1A] outlines the University procedure for resolving student complaints. In addition, EUP staff actively intervene to resolve direct or anonymous student complaints through the use of program provided complaint cards [9.3C].

Budgeting for distance education is the responsibility of EUP. Demand for physical facilities to deliver distance education has already led to additional [physical resources](#) (see below).

A recent survey of our distance education clients [9.8] revealed that the University is considered accessible, credible, experienced, and high tech. Clients commented positively on

the quality of programs, responsiveness of staff, and the student/client orientation of the institution. As a result of its distance education efforts, this change will increase the value of an MTU education to all MTU alumni.

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Resources

Human Resources

Existing academic faculty and EUP and ETS staff are adequate to ensure that students can successfully complete their programs. Seven EUP staff, three ETS staff, and a quarter time Instructional and Reference Librarian are dedicated to distance education.

EUP has administrative responsibility for our distance education programs. Its staff of seven [9.5A and 9.5B] are responsible for

1. assisting appropriate academic units with program development;
2. identifying potential clients and products;
3. preparing marketing materials to promote distance education programs; and
4. assisting with program implementation, including faculty, student, and industrial partner assistance.

EUP has a Student Services Coordinator dedicated to distance education, and the Distance Education Technology Help Desk will expand its support services and hours as enrollment increases. The Assistant Director, Research Services (Library), coordinates electronic reference services in support of distance education, which promote off site student use of information and research resources. Within each college or school, EUP interacts directly with the Dean or his/her designee about distance education programs. EUP also currently interacts with 15 off-campus Site Coordinators. These site coordinators are required to have appropriate academic credentials and are approved by the relevant academic department offering these courses.

Academic faculty retain primary responsibility for and oversight of courses and programs in a manner comparable to that for on-campus programs. Regular full-time faculty normally instruct courses on an overload basis for extra compensation. A complete list of faculty who have taught distance education courses and their vitas are available in the Resource Room [9.5D]. Adjunct faculty teach off-campus laboratory components of the BSE under the supervision of the course instructor and serve as doctoral committee

members in the PhD program [9.5E]. Mechanisms for monitoring and controlling faculty workloads as well as improving faculty delivery include:

1. procedures for overload compensation,
2. assistance with course adaptation and instructional design,
3. technical assistance in using and integrating distance education technology into the curriculum,
4. workshops that emphasize technology options to enhance effective teaching, and
5. practice sessions for using global distance-education technology.

[ETS](#) is responsible for the delivery systems and technical dissemination of distance learning programs. Three full-time staff are dedicated to distance education, but our programs enjoy the support of nine full-time professional staff, including the Manager for Education Technology, Media Production Coordinator, Videoconferencing Coordinator, Telecommunication Engineer, Telecommunication Technician, and other support staff for all aspects of global distance learning delivery systems [9.5A and 9.5C]. Facilities managed by ETS are discussed under [Physical Resources](#).



Financial Resources

Distance education activities are expected to be revenue-generating. Therefore, delivery of programs to corporate sponsors requires a contractual commitment from the sponsor to provide adequate financial resources. Funding for administration of distance education activities comes from course fees paid by the students and their employers. Corporate partners also provide staff time and other cost share for off-site help and facilities.

Distance education programs at MTU are governed by existing University financial policies and procedures. Established programs are continuously reviewed by the Director of EUP and other University administrators. Proposed programs are reviewed by the appropriate University administrators. Contracts with corporate partners are reviewed and approved by University administrators and counsel in accordance with established University procedures. Projected program budgets documenting anticipated start-up costs and projected program income and expenses are included in program proposals.

Since 1995/96, program incomes have exceeded program expenses. Any surplus is available for further reinvestment in the program. Financial projections for the next three academic years indicate program incomes will continue to exceed

program expenses. Financial projections are monitored and summarized on a quarterly basis and compared with expectations established in EUP's business and strategic plan [9.7]. Surpluses are a result of broadening corporate partnerships, expanding product lines, and controlling administrative costs.

All students are provided with information on existing financial aid programs and access to on-campus financial aid staff. Relatively few distance education students choose to take advantage of financial aid, however, because employers pay their fees and sponsor 98% of the students.

Faculty compensation of distance education teaching is flexible [9.2B, Faculty Compensation Procedure].



Physical Resources

Physical resources for day-to-day administrative support, maintained by EUP, include:

1. a WWW site [<http://www.admin.mtu.edu/eup>];
2. a Distance Education Technology Help Desk to answer faculty and student questions about how to access and use;
 - MTU computer accounts (e-mail, PPP),
 - converting documents into web pages,
 - converting documents into Adobe Portable Document Format (PDF),
 - methods of distributing distance education course information electronically; and
3. a toll-free telephone line to facilitate student communication with staff and faculty.

Student access to on-campus resources, which include the career center, library, learning centers, bookstore, and counseling services, is maintained through electronic means where feasible, and through the personal interaction of EUP's Student Services Coordinator when necessary.

Physical resources at Michigan Tech which allow the delivery of global distance education are managed primarily by ETS (detailed information about ETS and its resources is available at <http://www.ets.mtu.edu>):

- *Studio Classroom.* A 50-seat broadcast quality studio classroom in the Electrical Energy Resources Center (EERC, Room B045) has an instructor's console with program monitors, teleprompter, graphics area, and clock. The audio system is wireless and all controls are operated by ETS staff in a separate control room so the instructor can concentrate on course content. The studio

is equipped with a variety of input devices that include an overhead camera, computer scan converter, internet connection, world-standard videotape recorders, satellite feeds, digital slide projector, and other media. Classes taught in the studio are videotaped with a live class so the remote student receives the same lecture as on campus. Videotapes are then duplicated and sent to the remote sites. Programs can also be disseminated from this facility via satellite, compressed video, and cablecast.

- *Satellite Earth Station.* ETS operates the satellite earth station on the MTU campus. The uplink facility is used to transmit our courses to Michigan Information Technology Network and National Technological University affiliate sites throughout the nation. The system consists of a fully agile 7.0 meter Ku-band transmit/receive antenna capable of transmissions on all domestic Ku-band satellites. Three receive-only antennas are operated for both "C-" and "Ku-" band signals, bringing videoconferences and SCOLA to the campus.
- *Compressed Videoconferencing Facilities.* A centrally located videoconference facility in EERC (Room B11) accommodates both group meetings and desktop videoconferencing, and can be configured for a conference room or classroom. The console unit contains video cameras available to pan and zoom, four 27" video monitors, audio system, and videotape recorders. Multimedia input devices for presentations include a document camera, videocassette recorders, computer scan converter, internet connection and other auxiliary inputs. The operator's console provides touch screen interfacing into the global Sprint network over a T1 connection or PictureTel conferencing via ISDN and the internet. The system also integrates with the local K-12 fiber optic distance-learning network to eleven local school sites.
- *Videotape Duplications Services,* Network Operations Center (NOC), and maintenance facilities are also a part of the program.

Because the current distance learning facilities on-campus are well utilized, plans are being developed for additional studio classrooms in most of the academic buildings on campus. New building plans on campus have incorporated the studio-classroom design into several lecture halls. MTU's network infrastructure is designed to allow for program origination at a variety of sites on campus which can be routed to the central NOC. At the NOC, these programs can be disseminated via compressed video, satellite, cable, Internet, and, eventually, wireless technologies.

Off-campus facilities such as video classrooms, teleconferencing facilities, e-mail access, and laboratory

facilities are normally provided on-site by corporate partners. Occasionally, laboratories and access to computers are provided at nearby academic institutions such as community colleges through the assistance of the partner. Faculty have oversight of laboratories selected.

Instructional Resources



Curriculum, admission, and degree requirements for distance education are the same as those for the rest of the University. Regular full-time faculty deliver our distance education programs, which are part of regular University-approved degree programs, and use the same materials as on-campus courses. However, the availability and frequency of course offerings via distance education is negotiated with sponsoring corporate partners. These partners have the primary responsibility for communicating the availability and sequencing of course offerings to distance education students through their own publications [see 9.4C, *General Motors Technical Education Program (TEP) Schedule of Courses and Technical Presentations*, and 9.4B, BSE Sequencing].

The faculty determines the achievement of all students through our regular assessment program (see above, "[Assessment and Continuous Quality Improvement](#)"). The institution uses the same policies and procedures to ensure integrity of student work and credibility of credits and degrees awarded for both on-campus and off-campus students. In accordance with University policy, credit courses have occasionally been offered to non-traditional, non-degree seeking students admitted as special students to allow them to demonstrate potential for success in degree programs.

Access by distance education students to the library and other on-campus resources is facilitated by EUP as documented in the *MTU Distance Education Student Handbook* [9.1A]. Library staff are part of the review process for proposed distance education courses and programs to ensure that the library core collection is adequate for course preparation and student use [9.2D]. The Assistant Director of Research Services in the Library is currently investigating copyright issues for electronic media [9.2D]. Technology assistance was discussed under "[Physical Resources](#)."

To help faculty make appropriate choices with regard to instructional design for distance delivery, EUP provides workshops and individual training and assistance to participating faculty [9.1C, 9.5F, and 9.4A]. EUP also provides support in preparing materials. EUP works with Site Coordinators so these members of the distance education team can help students use the technological resources available [9.1B].

For additional information, please see *Distance Education Supporting Documentation* [9], which includes

9.1 Handbooks

- A. *MTU Distance Learning Student Handbook*
- B. *Site Coordinators' Guide*
- C. *Teaching at a Distance: Faculty Handbook*

9.2 Policies and Procedures

- A. Signature Sheet
- B. Faculty Compensation Procedure
- C. Faculty Evaluation Procedure and Admissions Procedure
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NCA Criteria

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In the preceding chapters, we discussed the purposes, resources, accomplishments, continuous improvement, and integrity of educational programs, research efforts, faculty, staff, and support services. Here, we will briefly recap our conclusions and identify additional patterns of evidence in order to demonstrate that we satisfy the five criteria established for accreditation by the North Central Association of Colleges and Schools - Commission on Institutions of Higher Education.

Criterion One: The institution has clear and publicly stated purposes consistent with its mission and appropriate to an institution of higher education.



Michigan Tech fulfills the requirements for Criterion One. In Chapter 2, we demonstrated that the University mission and vision are consistent with our legislative mandate and appropriate to a technological university. In subsequent chapters, we demonstrated that the purposes identified with undergraduate and graduate education, research, and support services were also consistent with the University mission and vision. Each college, school ([Appendix 6](#)), and department [2.6] now has a mission statement which reinforces and supports University purposes. Because the University and unit mission statements are published in documents available to faculty, staff, and students, and because these constituencies are accomplishing our purposes, we conclude that our constituencies understand our stated purposes. Moreover, alumni, the legislature, and other external constituents are also kept informed of our purposes through University publications [7], our WWW page, and regular presentations to legislative bodies.

In Chapter 2 we also described the current strategic planning process based on our eight University goals. This annual

planning process invites regular participation by faculty, staff, and students in setting objectives, measuring our progress, and thereby evaluating our purposes. We also involve external constituencies in the planning process through advisory boards at the university, college, school, and departmental levels. A significant outcome of our 1996/97 self-study process has been the review of University goals established in 1994 and recommendations for revision, discussed in Chapter 15.

Two purposes appropriate to an institution of higher education, and important to Michigan Tech, are freedom of inquiry and excellence in teaching and learning (see Chapters [3](#) and [6](#)). Michigan Tech's Board of Control guarantees freedom of inquiry to students and faculty in its policy on academic freedom, which is published in both the *Faculty Handbook* [1.2A] and the *Student Handbook* [1.2C]. Tenure also provides freedom of inquiry to faculty. Teaching excellence is part of every academic unit's mission. Commitment to excellence in learning is documented in our Program for Assessment of Student Academic Success [2.7A].

Criterion Two: The institution has effectively organized the human, financial, and physical resources necessary to accomplish its purposes.



Michigan Tech fulfills the requirements for Criterion Two. Throughout this Self-Study Report, we have demonstrated that we have effectively organized our human, financial, and physical resources to accomplish our purposes. Specifically, we have organized them in ways appropriate to a technological mission; balance in undergraduate teaching, graduate education, and research; and a residential and largely full-time student population.

Our human resources include an informed Board of Control ([Chapter 2](#)), qualified and experienced senior administrators (Chapters [1](#) and [12](#)), a faculty appropriately qualified for undergraduate and graduate teaching and research ([Chapter 6](#)), and a professional and unionized staff qualified to accomplish its support services (Chapters [4](#), [5](#), [9](#), [11](#), and [12](#)). University administration has been restructured since 1991 to optimize communication ([Chapter 1](#); see also [Appendix 7](#):

[Organization Charts](#)) and University policies and procedures have been updated and published in newly revised *Faculty Handbook* [1.2A] and *Student Handbook* [1.2C]; the *Policies and Procedures Manual* [1.5E] is being revised and a *Staff Handbook* is being developed.

University administration is also committed to shared governance (discussed in Chapters 1, 2, 6, and 9). Shared governance generates multiple processes through which faculty, staff, and students participate in decision making. Departments are governed by departmental charters, and faculty, staff, and students participate in governance through the University Senate, Staff Council, Undergraduate Student Government, Graduate Student Council, and various standing committees and task forces ([Appendix 8: Standing Committees](#)). The recommendations of many committees and task forces have been implemented over the past decade. There is some concern, however, that the number of committees and task forces required to accomplish the University's purposes is growing, which adds to the responsibilities of both a faculty that is trying to balance expectations for teaching and research and of a lean professional and unionized staff.

One aspect of shared governance is evaluation of senior administration (see [Chapter 6](#)). In 1991 and again in 1996, a commission was convened by the University Senate and chaired by a tenured faculty member to evaluate senior administrators. In 1991, senior administration did not receive positive ratings from the faculty, but in 1996 the President and Executive Vice President and Provost received positive ratings from approximately 75% of respondents (approximately 50% rated them as good or very good and 25% as "OK"), a significant turnaround. The Vice Provost for Research and Dean of the Graduate School also received positive ratings from faculty, and external reviewers evaluated him an effective and highly qualified administrator. One concern identified by the commission, that about 25% of the faculty did not know the Vice Provost for Research, is being rectified by meetings of the Vice Provost with all departments. Complete results of the commission's survey is available in the Resource Room [5.3E].

Michigan Tech succeeds in attracting highly qualified students. Although the University's enrollment has declined over the past four years, it remains sufficient to meet our stated purposes in undergraduate and graduate education (Chapters [4](#) and [7](#)). Coordinated recruitment and retention efforts are yielding positive results, and services to afford all students the opportunity to succeed have significantly expanded since 1988 (Chapters [4](#) and [5](#)).

Our financial resources are appropriately managed and sufficient to accomplish our purposes ([Chapter 12](#)). The State

of Michigan has provided adequate general fund monies as well as capital outlays and supplemental funding for technology. We have been able to keep tuition reasonable while making progress toward benchmark norms for faculty and staff compensation. Nonetheless, like most public institutions, we are acting to diversify our funding base through research grants and capital campaigns. Declining enrollments have eroded tuition revenue, but increased recruitment efforts appear to be succeeding. Increased first-year enrollment in 1997 signals a reversal of the previously discussed downward trend. Our pattern of expenditures shows a considerable growth in funds allocated to instruction (teaching and learning) since 1988, up from \$24.5 million to \$41.5 million, in spite of a smaller student body; this represents a stable allocation of nearly 40% of the total general fund budget. Consistent with our goals to achieve Carnegie Doctoral I status, our sponsored research expenditures have doubled since 1988, from \$11.3 million to \$20.9 million, thanks largely to success in attracting external funding for research.

Our physical resources are excellent. The physical plant ([Chapter 11](#)) is well-maintained and is expanding to provide additional classroom and laboratory space for the teaching, learning, and research appropriate to a technological university. Computing ([Chapter 10](#)) is state-of-the-art, and all faculty, staff, and students have access. Michigan Tech provides an exceptionally safe and healthy environment for students, thanks in part to its physical location. Two weaknesses are particular concerns, given our residential student population and remote location. One concern is the Library, which, while it continues to meet the service needs of the Michigan Tech community, is challenged to maintain a materials collection adequate for a technological research university. Another is the limited space for student life activities.

Criterion Three: The institution is accomplishing its educational and other purposes.



Michigan Tech fulfills the requirements for Criterion Three. Throughout this Self-Study Report, we have demonstrated that we are accomplishing our purposes of undergraduate education ([Chapter 3](#)), graduate education ([Chapter 7](#)), and research ([Chapter 8](#)) with a focus on science and technology. Graduating technologically competent leaders and communicators and disseminating the results of our basic and

applied research demonstrates accomplishment of our public service mission.

Because we have organized this Self-Study Report around our strategic goals, we have not examined particular curricula within the body of this report. However, the college and school self-studies ([Appendix 6](#)), the departmental self-studies [2.6], the *Undergraduate Catalog* [1.3A], and the *Graduate School Bulletin* [1.3B] all document courses of study that are clearly defined, coherent, intellectually rigorous, and responsive to the needs of the region and its industries. Specialized accrediting bodies accredit programs in engineering and forestry, and our business program is in candidacy for specialized accreditation.

We have set new goals for General Education ([Chapter 3](#)) that will stimulate the understanding of personal, social, and civic values, and promote an understanding of scientific inquiry, fundamental to our science and technology mission. Cooperative learning strategies, teamwork, capstone courses, research opportunities for undergraduates, computer-assisted instruction, and electronic media all create interaction between students as well as between students and faculty and increase the use of research in undergraduate programs. We have taken the first step toward assessment of student academic achievement: every academic unit has a written plan for assessing student academic achievement in skills, competencies, and knowledge [2.7A], and preliminary results are available in some units.

Effective teaching is required by all faculty for reappointment, promotion, and tenure, and teaching evaluations document student satisfaction with teaching ([Chapters 3](#) and [4](#)). Learning Centers, the Library, computer laboratories, academic advising, and other academic support programs, as well as automated administrative support systems (i.e., BANNER®) contribute to effective delivery of our educational programs and preparation of accurate student transcripts. A diverse array of student organizations, student services and student life programs, and cultural programming ([Chapter 5](#)) provide significant opportunities for students' personal development and assure their well-being.

Allocation of General Fund monies for graduate education and research demonstrates Michigan Tech's strong commitment to research. We successfully achieved Carnegie Doctoral II status in 1994 and now meet threshold status for Doctoral I. Research and graduate programs have grown substantially and an external review of the Office of Research and Graduate School gave it high marks ([Chapters 7](#) and [8](#)).

Faculty and staff provide significant levels of service on University and departmental committees and task forces, as well as to their disciplines. However, faculty development

and training and development for professional staff continue to warrant institutional attention and financial commitment (Chapters [6](#) and [9](#)).

Criterion Four: The institution can continue to accomplish its purposes and strengthen its educational effectiveness.



Michigan Tech fulfills the requirements for Criterion Four. Our annual strategic planning process, established in 1993 and providing our framework for self-study, evaluates our progress against strategic goals designed to ensure our future viability and educational effectiveness. We have demonstrated the involvement of all University constituencies in that process ([Chapter 2](#)) and copies of the Strategic Plan and annual updates of strategic initiatives are available in the Resource Room [2.1D]. We took advantage of the self-study process to evaluate the strengths, weaknesses, opportunities, and threats to each strategic goal, and in Chapter 15 we evaluate the strategic plan as a whole and recommend revisions.

The review of each goal in this self-study demonstrated the adequacy of our current resource base to meet current objectives and outlined specific recommendations for improvement. The new executive leadership has received high marks from faculty and staff; they have succeeded in overturning an earlier climate of mistrust. Our system of decentralized decision making and shared governance enables broad input into decision making, which improves our ability to respond effectively to unanticipated challenges. Our new faculty will serve us well into the future, and the new position of Vice Provost for Instruction and the new Center for Teaching, Learning, and Faculty Development will encourage continuous improvement of teaching and learning. Total quality processes are helping staff to continuously improve support services.

However, our ability to achieve some of our long-range goals for research and diversity have been questioned, and we have yet to demonstrate the effectiveness of our assessment processes for student academic achievement.

Criterion Five: The



institution demonstrates integrity in its practices and relationships.

Michigan Tech fulfills the requirements for Criterion Five. University publications, including the *Undergraduate Catalog* [1.3A] and *Graduate School Bulletin* [1.3B], fairly and accurately represent Michigan Tech, our programs, and our courses (Chapters [3](#) and [7](#)). As a public institution, our records are open to the public, and meetings of the Board of Control are public meetings under Michigan's Open Meetings Act (Public Act 267). Board meetings are publicized and most meetings are held on Michigan Tech's campus. Although the physical distance of most Board members from the University occasionally creates problems in generating a quorum for Board meetings, increasing sophistication in distance conferencing facilities will help to mitigate this problem; however, public access needs to be assured.

Although our focussed mission in science and technology and remote location are impediments to increasing diversity, Michigan Tech has endeavored to build a diverse educational community (Chapters [4](#), [5](#), [6](#), and [9](#)). Numerous strategic objectives at the University and unit level have led to the dedication of financial resources to increasing diversity.

The Office of Affirmative Programs, which reports directly to the President, monitors fairness in hiring practice and employee treatment [2.6H3]. The *Faculty Handbook* [1.2A], the *Student Handbook* [1.2C], and the *Policies and Procedures Manual* [1.5E] describe policies and practices for faculty, students, and staff; these include conflict of interest, discrimination and harassment, grievances, academic integrity, and academic freedom (Chapters [5](#), [6](#), and [9](#)). A Conflict of Interest Coordinator reviews sponsored research for conflict of interest and gives recommendations on conflict of interest issues throughout the University. Faculty, staff, and students with grievances have recourse to appeals and hearings with several internal bodies, such as the University Ombudsman, the Committee on Academic Tenure, and the Academic Integrity Committee, as well as the Affirmative Action Officer. Collective bargaining with unionized staff has yielded favorable relationships. Insofar as these policies have been tested, practice appears consistent with policy.

Relationships with external bodies are conducted ethically. These include NCAA ([Chapter 5](#)), external funding agencies ([Chapter 8](#)), businesses that provide services (Chapters [11](#) and [12](#)), and the Michigan Tech Fund ([Chapter 12](#)). Research Accounting specifically monitors all research-related grants and contracts; the Intellectual Property Office keeps

researchers informed about copyright and patent information ([Chapter 8](#)). A concern on the horizon is copyright issues that pertain to electronic information; a study that we anticipate will lead to a University policy will be conducted in 1997/98.

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Taking Action
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In Chapters 3–12 of this Self-Study Report, we have addressed each University goal separately—identifying strengths, weaknesses, opportunities, and threats (SWOT) related to each goal and suggesting actions that we could take to accomplish that goal. Because these SWOTs and actions represent the consensus of the Goal Committees and the Steering Committee who studied University progress toward these goals, and not necessarily the consensus of the entire University community or administration, these action plans will be integrated into the 1998/99 strategic planning process as potential new strategic initiatives.

In this chapter we conclude with:

1. an analysis of our overall strengths, weaknesses, opportunities, and threats;
2. an action plan to address these SWOTs; and
3. revisions to the strategic plan that resulted from the self-study process.

These three concluding sections were prepared by the University Self-Study Steering Committee based on a review of both the SWOT and action plan for each goal and on the University's Strategic Plan. They represent our learning from the self-study process and our commitment to improvement.

SWOT Analysis

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STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Technology mission • Undergraduate curriculum • Innovative graduate programs • Affordable tuition • Academic support systems (e.g., Learning Centers, CTLFD) • Diversity programming • Good undergraduate retention • Graduate program growth • Commitment to and incentives for research • Growth in research • Carnegie doctoral status • Experienced and supportive administration • Quality faculty • Quality staff 	<ul style="list-style-type: none"> • Lack of consensus on General Education's purposes • Uneven implementation of assessment programs across departments • Academic calendar • Instructional technology • Library collection and space • Feedback and evaluation of faculty • Professional development for staff • Student academic and career advison

- Quality students
- Shared governance
- Advisory boards
- Automated management systems (e.g., BANNER®, the Library's Voyager)
- Computing network
- Excellent, well-maintained facilities
- State funding
- Strong financial position with limited indebtedness

- Coordination of student services and student life
- Evaluation of student services and student life programs
- Coordination of student recruiting
- Declining enrollment
- Insufficient diversity in students, faculty, and staff
- No systematic review of all undergraduate or graduate programs
- Accounting system for sponsored programs
- No long-term financial plan



OPPORTUNITIES

- National focus on undergraduate education
- Increased public expectation for accountability in higher education
- Healthy State and national economy
- Increased Federal financial aid
- Demographics for women and underrepresented high-school students
- Industry and government partnerships
- Corporate sponsorship of student life activities
- Significant base of successful alumni
- Increasing speed and power of information technology and electronic information delivery
- Small town, safe, outdoor lifestyle

THREATS

- Uneven preparation in math and science at the high school level
- National decline in interest in engineering by high school students
- Distance from pool of potential students
- Diminished external financial support for outreach and support programs
- Recent rulings against Affirmative Action
- Limited and competitive funding for graduate education and research
- Rapid rate of technological change
- State constraints on tuition increases
- Matching funds required for State capital outlays
- Public misunderstandings about faculty role
- Remote location and cold physical climate

Action Plan



To build on our strengths, remedy our weaknesses, take advantage of opportunities, and face our threats, Michigan Tech will take the following actions:

	What	Who
1	Build a University-wide consensus on our program of General Education.	<ul style="list-style-type: none">• Executive Vice President and Provost• Vice Provost for Instruction
2	Improve our assessment of student academic achievement.	<ul style="list-style-type: none">• Executive Vice President and Provost• Vice Provost for Instruction
3	Create an Enrollment Management Advisory Team to coordinate and integrate University and departmental recruiting objectives.	<ul style="list-style-type: none">• Executive Vice President and Provost
4	Implement Retention Task Force recommendations and regularly assess our progress.	<ul style="list-style-type: none">• Executive Vice President and Provost
5	Coordinate and assess student services and student life opportunities.	<ul style="list-style-type: none">• Executive Vice President and Provost• Vice Provost and Dean of Student Affairs
6	Review and strengthen the system of feedback on, evaluation of, and development of faculty.	<ul style="list-style-type: none">• Executive Vice President and Provost

7

Conduct internal and external reviews of all graduate programs.

- Director, Center for Teaching, Learning, and Faculty Development

- Executive Vice President and Provost
- Dean of the Graduate School

8

Improve the system of accounting for sponsored programs and communication with clients.

- Executive Vice President and Provost
- Chief Financial Officer

9

Increase professional development and growth opportunities for staff.

- Executive Vice President and Provost
- Director of Human Resources

10

Define the library of the future and provide adequate support to create it.

- Executive Vice President and Provost
- Director of the Library

11

Define University and unit responsibilities for acquiring and maintaining information technology.

- Executive Vice President and Provost
- Vice Provost for Information Technology

12

Establish a long-term budget for special maintenance and facility renewal.

- Executive Vice President and Provost
- Director of Facilities

13

Develop a five-year operating and capital-outlay budget.

Management

- Executive Vice President and Provost
- Director of Budget, Planning, and Faculty Personnel

Revising the Strategic Plan [Top](#)

At the end of the self-study process, the Steering Committee made numerous suggestions to revise the University Strategic Plan. Some of the suggestions involve reorganizing and clarifying the objectives, while other revisions are significant additions or amendments to University objectives or goals. Here we briefly state the significant changes. A complete draft of the revised plan is included as Appendix 10. These revisions will also be integrated into the strategic-planning process in 1998/99.

	Goal	Revision
1.1	Undergraduate Education	<p>Add Objectives</p> <hr/> <p>Strengthen and improve General Education Program.</p> <hr/> <p>Enhance methods for evaluating, improving, and rewarding quality instruction.</p> <hr/> <p>Improve instruction through the increased use of technology.</p> <hr/> <p>Increase rates of student persistence.</p> <hr/> <p>Increase the number of students participating in off-campus broadening</p>

			<p>opportunities in international study, cooperative education, and internships.</p> <hr/> <p>Revise the academic calendar.</p> <hr/> <p>Enhance learning centers.</p> <hr/>
1.2	Recruitment	Add Objective	<hr/> <p>Recruit students whose academic interests enhance intellectual diversity.</p> <hr/> <p>Develop student and alumni networks to aid in recruiting.</p> <hr/> <p>Encourage faculty involvement in recruiting.</p> <hr/> <p>Develop a unified marketing strategy.</p> <hr/>
1.3	Student Life	Add Objective	<hr/> <p>Improve advising of student organizations.</p> <hr/>
2.1	Attract Faculty	Add Objective	<hr/> <p>Develop proactive approach to improving and increasing candidate pools.</p> <hr/>
2.2	Retain Faculty	Add Objectives	<hr/> <p>Increase and support mentoring of junior faculty by senior faculty.</p> <hr/> <p>Educate the University's publics with regard to the roles and duties of</p>

			<p>University faculty.</p> <hr/> <p>Enhance development opportunities for department chairs.</p> <hr/> <p>Develop and implement a standard post-tenure planning, evaluation, and feedback process.</p> <hr/> <p>Improve departmental processes for allocating faculty teaching loads.</p> <hr/> <p>Recognize and reward effective teaching.</p> <hr/>
3.1	Graduate Programs	Amend Objectives	<hr/> <p>Develop and implement a comprehensive strategy to recruit quality and diverse graduate students.</p> <hr/> <p>Develop and implement programs to assure successful and timely completion of graduate programs.</p> <hr/>
3.3	Graduate Student Life	Add Subgoal	<hr/> <p>Provide an environment that enhances the quality of graduate student life.</p> <hr/>
		Add Objectives	<p>Develop and implement programs to address deficiencies in areas such as office space, information services, and benefits.</p> <hr/> <p>Improve the climate</p>

			<p>for women and underrepresented graduate students.</p> <hr/> <p>Encourage professional development opportunities as well as social-political-cultural involvement.</p> <hr/> <p>Provide a quality living environment for on-campus students.</p> <hr/>
5	Professional and Represented Staff	Amend Goal	<hr/> <p>Attract, retain, support, and develop excellent staff.</p> <hr/>
		Add Objective	<p>Explore the possibility of promotional ladders for staff</p> <hr/>
6	Information Technology	Amend Goal	<hr/> <p>Provide comprehensive information services.</p> <hr/>
		Add Subgoals	<p>Subgoal 1: Develop a library appropriate to a research university.</p> <hr/> <p>Subgoal 2: Sustain a computing infrastructure appropriate to a research university.</p> <hr/>
6.1	Library	Add Objectives	<hr/> <p>Address space deficit with short- and long-term solutions.</p> <hr/>
6.2	Computing	Add Objectives	<hr/> <p>Enhance capability to deliver integrated</p>

			<p>computing and educational technologies.</p> <hr/> <p>Improve coordination, training, professional development, and back-up for systems administrators.</p> <hr/>
7	Physical Plant	Add Objectives	<hr/> <p>Renovate vacated space created by moves to the Dow Building.</p> <hr/> <p>Establish multi-year maintenance and renewal budget.</p> <hr/>
8	Financial Environment	Add Objectives	<hr/> <p>Develop a plan for systematically addressing financial exigency/retrenchment issues.</p> <hr/> <p>Develop a 5-year budget plan.</p> <hr/>

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Worksheet for Statement of Affiliation Status

Institution: Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Type of Review: Continued Accreditation

Date of This Review: January 12–14, 1998

Commission Action:

Status: Accredited (1928– .)

Institution Recommended Wording: No change

Team Recommended Wording:

Highest Degree

Awarded: **Doctor's**

Institution Recommended Wording: No change

Team Recommended Wording:

Most Recent

Action: **June 24, 1988**

To be changed by the Commission Office

Stipulations on Affiliation

Status: **None**

Institution Recommended Wording: No change

Team Recommended Wording:

New Degree

Sites: **Prior Commission approval required**

Institution *Recommended Wording:* No prior commission approval required for offering courses and degree programs at new sites.

Team *Recommended Wording:*

Progress

Reports

Required: **None**

Team *Recommended Wording:*

Monitoring

Reports

Required: **None**

Team *Recommended Wording:*

Contingency

Reports

Required: **None**

Team *Recommended Wording:*

Other Visits

Required: **None**

Team *Recommended Wording:*

Last
Comprehensive
Evaluation: 1987-88

To be changed by the Commission Office

Next
Comprehensive
Evaluation: 1997-98

Team Recommended Wording:

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TABLE 13. Sponsored Research Expenditures, by Departments, Colleges, and Schools.

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Unit	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96
College of Engineering								
Dean, Engineering	13	116	147	0	0	70	77	73
Chemical Engineering	377	818	677	642	715	936	920	1,236
Civil and Environmental Engineering	708	741	863	1,132	1,593	2,465	3,310	3,205
Electrical Engineering	180	355	392	460	426	485	365	674
Geological Eng. and Sciences	195	286	328	397	577	1,081	1,297	1,831
Mechanical Eng./Eng. Mechanics	876	1,293	1,228	1,262	1,451	1,570	1,720	1,722
Metallurgical and Materials Eng.	1,207	1,240	1,577	1,290	1,555	1,405	1,647	1,547
Mining Engineering	241	238	167	355	215	111	216	160
College of Engineering Total	3,797	5,087	5,379	5,538	6,532	8,124	9,553	10,449
College of Sciences and Arts								
Biological Sciences	743	678	689	529	526	840	884	1,230
Chemistry	*	*	257	349	154	38	118	366
Computer Science	181	0	0	24	69	89	189	175

Education	0	0	0	0	0	246	16	0
Humanities	117	103	0	0	0	1	1	23
Mathematical Sciences	80	61	56	67	100	153	253	190
Physics	582	265	376	236	287	440	522	633
Social Sciences	43	8	78	156	35	61	97	85
College of Sciences & Arts Total	1,746	1,115	1,456	1,361	1,171	1,867	2,081	2,702
School of Forestry and Wood Products								
School of Forestry	1,507	1,820	1,539	1,311	1,381	1,509	1,573	1,703
Institute of Wood Research	342	327	462	630	859	842	1,015	1,361
School of Forestry Total	1,849	2,147	2,001	1,941	2,240	2,351	2,588	3,064
Other Research								
School of Business and Economics	0	0	0	0	0	0	32	20
School of Technology	13	2	6	6	0	0	0	0
Institute of Materials Process	1,231	1,544	1,282	790	815	536	1,032	1,115
Keweenaw Research Center	2,149	2,899	2,922	2,372	3,096	3,301	2,787	2,959
Institutes	488	557	906	689	575	490	755	590
University Total	11,273	13,351	13,952	12,697	14,429	16,671	18,828	20,900

* Chemistry was included in Chemical Engineering 1988-1990

Source: Research Accounting (Dollars in thousands)

TABLE 14. Total Research Expenditures—1993/94.

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Institution	Dollars	% of Total Expenditures
Georgia Tech	143,448,843	43.1%
Carnegie Mellon	114,853,000	36.1%
Rensselaer Polytechnic Institute	28,643,000	17.3%
Lehigh	25,089,000	16.1%
Michigan Tech	20,202,000	21.5%

Univ of Missouri - Rolla	13,986,519	18.0%
Colorado School of Mines	12,420,329	22.8%
Clarkson	5,844,000	10.3%

Source: IPEDS Finance Survey (Current Fund)

TABLE 15. Faculty and Staff Publications by Academic and Research Unit.

[[BACK](#)]

Unit	1988-90 Average			1994		
	Archival	Proceedings	Total	Archival	Proceedings	Total
Chemistry/Chemical Engineering	16.0	3.5	19.5	21.0	11.0	32.0
Civil and Environmental Engineering	7.5	17.0	24.5	19.0	9.0	28.0
Electrical Engineering	17.0	21.0	38.0	8.0	15.0	23.0
Geological Engineering and Sciences	12.0	2.0	14.0	9.0	13.0	22.0
Mechanical Engineering/Engineering Mechanics	27.0	30.5	57.5	58.0	61.0	119.0
Metallurgical and Materials Engineering	20.5	12.5	33.0	20.0	26.0	46.0
Mining Engineering	1.0	4.5	5.5	2.0	5.0	7.0
College of Engineering Total	101.0	91.0	192.0	137.0	140.0	277.0
Biological Sciences	20.0	6.0	26.0	18.0	14.0	32.0
Computer Science	5.0	4.5	9.5	5.0	7.0	12.0
Humanities	19.5	12.0	31.5	14.0	20.0	34.0
Mathematical Sciences	16.0	1.5	17.5	25.0	14.0	39.0
Physics	29.5	4.0	33.5	29.0	8.0	37.0
Social Sciences	4.5	6.5	11.0	9.0	5.0	14.0
College of Sciences and Arts Total	94.5	34.5	129.0	100.0	68.0	168.0
School of Business and Economics	7.5	5.5	13.0	9.0	5.0	14.0
School of Forestry and Wood Products	24.0	16.0	40.0	36.0	20.0	56.0
Institute of Materials Processing	5.0	3.5	8.5	0.0	4.0	4.0

Keweenaw Research Center	1.0	1.0	2.0	0.0	0.0	0.0
University Totals	233.0	151.5	384.5	282.0	237.0	519.0

Source: Goal 4 Committee Report [6.2B6]

TABLE 16. Tenured/Tenure-Track Faculty Citations.

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Unit	Number of tenured /tenure-track faculty...			Total citations for Unit	Number of Citations of Most Frequently Cited Faculty Member	Average(# of Citations/# of Faculty who responded.)
	in unit.	who gave citation data.	who were cited in 1994.			
College of Engineering	137	89	58	1,265	110	14.2
College of Sciences and Arts	84	44	41	753	210	17.1
School of Business and Economics	24	6	5	11	3	1.8
School of Forestry and Wood Products	21	4	4	111	68	27.8
School of Technology	-	-	-	-	-	-
University Total		143	108	2140	-	-

Source: Goal 4 Committee Report: Table 4 [6.2B6]

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Support	\$6,207	\$6,491	\$6,849	\$7,764	\$6,226	\$6,505	\$6,211	\$6,947	\$7,412
Library (included above)	\$1,648	\$1,855	\$1,874	\$2,049	\$2,041	\$2,279	\$2,356	\$2,743	\$2,719
Other Academic Support	\$4,559	\$4,636	\$4,975	\$5,715	\$4,185	\$4,226	\$3,855	\$4,204	\$4,693
Student Services	\$3,822	\$3,809	\$4,684	\$4,553	\$4,627	\$4,587	\$3,552	\$3,735	\$3,987
Institutional Support	\$7,740	\$6,634	\$7,975	\$9,444	\$10,691	\$6,867	\$7,120	\$8,924	\$6,958
Operation Plant	\$4,621	\$4,794	\$5,433	\$5,836	\$5,753	\$5,948	\$6,373	\$6,486	\$6,917
Student Financial Support	\$4,739	\$5,701	\$6,488	\$6,968	\$10,771	\$12,572	\$13,497	\$13,419	\$13,314
Total	\$63,873	\$63,518	\$71,937	\$81,346	\$82,338	\$85,969	\$94,010	\$101,240	\$104,831

Source: IPEDS Finance Survey (Dollars in Thousands)

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