

## **Student Inaug Address 1.5**

### **Introduction**

As some of you may know, I am a scientist and engineer  
by training and background...

I must also confess I tend to be one of those  
people who lives more in the future than in  
the present or the past...

I can remember that...

in the 1960s I was working out at Los Alamos  
on nuclear rocket engines designed to  
power the first manned mission to Mars...

in the 1970s I was working in an exotic  
area known as laser-induced thermonuclear  
fusion in which we were attempting to use  
super high powered lasers to compress  
matter to the incredible densities and  
temperatures found in the center of stars..  
and create tiny thermonuclear explosions  
in the laboratory, hence providing a  
limitless source of power...

in the 1980s I refocused my efforts on  
building an Engineering College which I  
believed could trigger a major economic  
resurgence in this state...and lead  
efforts to build world-class programs in  
robotics, microelectronics, artificial  
intelligence, and computers

In the late 1980s as a member of the  
National Science Board, I have been  
working very hard to strengthen the  
science and engineering base of this country...  
with my particular focus on the development  
of the scientists and engineers we will  
need to keep our nation strong and

And, now, entering the 1990s, I find myself  
looking once again to the future, facing  
the challenge of helping to build a University  
able to serve our state and our nation in  
the 21st Century.

### **A Vision of the Future**

It is important to realize that while you and your classmates were born in the 20th Century, you will in fact be spending the majority of your lives in the next century... You will be citizens of the 21st Century!

(You probably should also be aware that those of us on the faculty are very much products of the 20th Century, while much of this institution is, in reality, a product of the 19th Century!)

Hence it is appropriate that we look ahead for a moment at the future you will inherit...and perhaps draw some conclusions about what you should be doing now to prepare yourself for it!

While it is always dangerous to speculate about the future, three themes seem crystal clear...

- i) It will be a future in which our nation becomes a truly multicultural society, with a cultural, racial, and ethnic diversity that will be truly extraordinary in the history of our civilization...
- ii) It will also be a future in which America will become "internationalized"... in which every aspect of American life must be viewed from the broader context of our place in the global community... as America becomes a "world nation", with ethnic ties to every part of the globe...
- iii) Finally, it will be a future in which we rapidly evolve from a resource- and labor-intensive society to a knowledge-intensive society...in which intellectual capital...educated people and their ideas...become the keys to our prosperity, security, and well-being.

Let's explore these themes for a moment to see how they might impact on your college education...

### **Theme 1: The Challenge of Demographic Change**

America is changing rapidly...

When we hear references to the demographic changes occurring in our nation, our first thought probably focuses on the aging of our population.

It is indeed true that the baby boomers are now entering middle age, and their generation has been followed by a baby bust... in which the number of young adults will be declining over the remainder of this century by roughly 20%.

And while the rapid increase in the average age of the American population is being driven primarily by the

huge increase in the number of middle-age Americans as the baby boom grows up, this has followed on the heels of a significant growth in the 1980s in the number of senior Americans.

Indeed, today there are more people over 65 than teenagers in this country, and this situation will continue for the remainder of our lives.

Further, the growth rate in both our population and workforce is declining to the lowest level in our nation's history.

America will simply not be a nation of youth again in our lifetimes.

(Note: This is in sharp contrast with much of the rest of the world. For example, in Latin America and Asia, the young comprise 40% of the population, in contrast to 20% in the US and Europe)

Yet, there is a far more profound change occurring in the population of our nation.

America is rapidly becoming the most pluralistic, multicultural nation on earth.

By 2000, one-third of college age students will be Black or Hispanic...

By 2000, 47% of our school children (K-12) will be Hispanic or Black (today 25% are)

In the second half of 21st Century, Hispanics will likely become the largest population group in America

Those groups we refer to today as minorities will become the majority population of our nation in the century ahead...just as they are today throughout the world.

Note: It is important to realize here that 21st Century America will NOT be a melting pot in which all cultures are homogenized into a uniform blend.

Rather, it will be pluralistic...composed of peoples of vastly different backgrounds, cultures, and beliefs...peoples who seek to retain their cultural roots...to maintain their differences.

In this future, full participation of currently underrepresented minorities will continue to be of central concern for reasons of equity and social justice.

But, in addition, this objective will be the key to the future

strength and prosperity of America, since our nation cannot afford to waste the human talent represented by its minority populations.

Full participation of underrepresented minorities is not just a matter of equity and social justice.

America cannot afford the loss of this human potential, cultural richness, and social leadership.

If we do not create a nation that mobilizes the talents of all our citizens, we are destined for a diminished role in the global community, increased social turbulence, and most tragically, we will have failed to fulfill the promise of democracy upon which this nation was founded.

As both a reflection and leader of society at large, higher education has a special challenge and responsibility to develop effective models of multicultural, pluralistic communities.

We must strive to achieve new levels of understanding tolerance, and mutual fulfillment for peoples of diverse racial and cultural backgrounds.

On this campus many of you have encountered for the first time in your lives the remarkable diversity and richness of peoples of different races, cultures, religions, nationalities, and beliefs.

They, like you, bring characteristics of great value to our campus...talent, intelligence, ambition,... and the rich diversity of perspectives and experience...

One of the most important things you must learn on this campus is to respect others for their differences...as well as their similarities.

Our challenge is not to make one group from many, to blend together all cultures into a homogeneous mixture...but to build from many varying cultural, racial, and ethnic groups a truly multicultural community in which we share those common beliefs and values which bind us together.

All of us--faculty, staff, and students--must recognize that the challenge of diversity is our challenge and our responsibility, and until we recognize and accept this both as individuals and as members of the University community, we are unlikely to achieve our goals.

We can secure this future by setting aside confrontation and empty rhetoric, by seeking the understanding that comes from working side by side, by engaging in thoughtful dialogue, and by standing firm in our commitment to the creation of a pluralistic community on this campus.

## **Theme 2. The Internationalization of America**

Every aspect of American life is becoming internationalized...

The signs are all about us...

Communications, travel, the arts and culture

Political security and interdependence...

Internationalization of commerce, capital, and labor...

Some facts of life:

The fact is that a truly domestic US economy has ceased to exist.

The market for nearly all significant manufacturing industries has become world-wide

In slightly more than 5 years, US trade deficit has taken us from the world's largest creditor to its largest debtor nation.

Jack Welch, CEO of GE, noted last November:

"Within the next 2 to 3 years, at most, the most important alliances will be forced in every significant global industry--medical, autos, defense, materials, and so on. Those who are slow to recognize the emergence of these global alliances or to act in forming them will find themselves locked out of the game as we enter the 1990s."

American will no longer take its know-how and apply it to low-cost natural resources from third-world countries, turn it into products, and then sell it back to them--as we do in a hierarchical economy. Rather, we'll be only one member in a global dynamic economy with tremendous network interdependency between countries.

The "shrinking globe" phenomenon suggests that understanding cultures other than our own is necessary not only for personal enrichment and good citizenship in the global community, but indeed, necessary for our very survival as a nation...

But there is another important reason for our renewed attention

to the international agenda of the University.

The US has become the destination of about half the world's immigrants

Probably 10 million this decade alone...

With falling fertility rates, immigration will soon become  
the main determinant of the variability in our population.

America is evolving into the first true "world nation",  
shifting rapidly away from Eurocentricity into a society  
with strong ethnic ties to all parts of the globe--  
with a growing focus on the nations of the Pacific Rim.

We are no longer self-sufficient or self-sustaining. We are not  
immune to the shocks of the world society. We have never  
been more dependent on other nations and peoples.

This University is a truly international center of learning...  
and it is important that you take advantage of this during  
your education...

whether through formal studies of other cultures  
whether through study abroad  
or simply by going out of your way to get to know students  
and faculty from other nations...

### Theme 3. The Age of Knowledge

Looking back over history, one can identify certain  
abrupt changes, discontinuities, in the nature,  
the very fabric of our civilization...

The Renaissance, the Age  
of Discovery, the Industrial Revolution

There are many who contend that our society is  
once again undergoing such a dramatic shift in  
fundamental perspective and structure.

As Erich Bloch, Director of the National Science Foundation  
suggests, we are entering a new age, an "Age of  
Knowledge"

The signs are all about us.

Our traditional industry economy is shifting to a new  
knowledge-based economy, just as our industrial  
economy evolved from an agrarian society at the  
turn of the century.

Some examples:

1. Industrial production is steadily switching away from  
material and labor intensive products and processes  
to knowledge intensive processes:

In a car, 40% materials, 25% labor...

In a chip, 1% materials, 10% labor, 70% knowledge!!!

2. Our nation's future has probably never been less constrained by the cost of natural resources. Future areas of growth are likely to come from the application of technologies that require few natural resources.
3. Increasing manufacturing production has come to mean decreasing blue collar employment!  
In the 1920s, 1 of 3 was a blue-collar worker today 1 in 6 and dropping fast probably to about 1 in 20 within a couple of decades...  
Indeed, UM economic studies suggest that less than 5% of General Motors' work force will be unskilled labor by the year 2000.
4. Recent Office of Technology Assessment report:  
40% of all new investment in plant and equipment goes to purchase information technology

A transition in which..

Intellectual capital--brainpower-- is replacing financial and physical capital as key to our strength, prosperity, and well-being

This is having a profound impact on our social structure, culture, and economy.

There is also great intellectual change and ferment...

New ideas and concepts are exploding forth at ever increasing rates...

We have ceased to accept that there is any coherent or unique core of wisdom that serves as the basis for new knowledge...

We've seen simply too many instances in which a new concept has blown apart our traditional views of a field...

Einstein's theory of relativity  
quantum mechanics  
the molecular foundations of life...  
superstring theory

We are increasingly surrounded by radical critiques of fundamental premises and scholarship...

In many fields, the knowledge base is doubling every

few years...

The typical college graduate of today will  
likely change careers several times during a  
lifetime...

Hence a college education today will only serve as  
the stepping stone to a process of lifelong education...  
and the ability to adapt to...indeed, to manage  
change...will become the most valuable skill of all.

You must prepare yourselves for a future in which permanence and stability  
are less valued than flexibility and creativity...  
in which the only certainty will be the presence of  
continual change...

So how does one go about preparing for this future?

### **Response 1: The Need for a Liberal Education**

These challenges suggest that the principal  
focus of an undergraduate education appropriate  
for the 21st Century will be the goal of liberal learning...  
that is, a liberal education as the preparation for  
a lifetime of learning.

Alfred North Whitehead, in

his "Aims of Education", puts it best:

"Though knowledge is one chief aim of intellectual  
education, there is another ingredient, vaguer but  
greater and more dominating in its importance.  
It is wisdom. You cannot be wise without some  
basis of knowledge, but you may easily acquire  
knowledge and remain bare of wisdom.

Wisdom is the way in which knowledge is held. It concerns  
the handling of knowledge, its selection for the  
determination of relevant issues, its employment to  
add value to our own immediate experience. This  
mastery of knowledge which is wisdom is the most  
intimate freedom obtainable.

The only avenue toward wisdom  
is by freedom in the presence of knowledge, the  
only avenue towards knowledge is by discipline in  
the acquirement of ordered facts."

To stress this point, I usually take the opportunity  
at University rites of passage such as Freshman  
Convocation or Commencement to recall that



haunting passage from T. S. Eliot's poem, the Rock:

"Where is the life we have lost in living?"

"Where is the wisdom we have lost in knowledge?"

"Where is the knowledge we have lost in information?"

We must not view undergraduate education at Michigan  
as simply aimed at extracting knowledge from the vast  
information characterizing our society.

Instead, our goal, indeed, the goal of any liberal education,  
must be to help our students learn how to extract wisdom from  
knowledge -- and through that wisdom, prepare them  
to learn the art of life itself...

We must enable our undergraduates  
to find the wisdom in knowledge...  
and hence to find the life that is in living"

#### Response 1': A Complete Education

Note that the liberal arts include not just the arts  
and humanities; it also includes the natural and social sciences.  
Together the sciences and humanities are  
known as the "liberal arts" because of their potential to  
liberate the human intellect and the human spirit.

In American universities we do not insist on a  
balanced education for our students, and  
although most humanists and social scientists  
are literate, they are not numerate; they graduate  
without a reasonable background in science, a background  
that they will need to cope with and help with the increasing  
technology of the modern world.

We really haven't appreciated impact of science and technology.

Examples of just the past few months:

- i) hole in the ozone layer over Antarctica
- ii) new supernova in the heavens
- iii) new high temperature superconductor
- iv) a new theory suggesting that all matter is composed  
of infinitesimal "superstrings" rather than point particles

Technological change is a permanent feature of our environment

Yet, at the same time public ignorance is extraordinary!

A recent NSF survey indicated that only 18% of those  
asked said they knew how a telephone works -- and  
only half of these gave the right answer.

Yet more than half of those surveyed indicated they

believed we were being visited by aliens from outer space!

Furthermore, the fundamental reason for this difficulty is that education in science is highly vertical, where one subject is built upon knowledge of another, whereas scholarship in the humanities is much less vertical; it is primarily extensive rather than intensive.

Unlike literature or social science, the highly vertical subjects of science are very difficult to learn after college. Unless one learns the language of science, mathematics, in college, one is likely to remain scientifically illiterate for life.

It wasn't always this way. Today most colleges require only 2 or 3 semester courses in science. In 1850 Harvard required 25% mathematics and science including physics, zoology, chemistry, and biology.

What can be done? If MIT and Caltech demand that their science students take 25% in the humanities, perhaps we should require that humanists invest 20% to 25% of their effort in science...at least leading them up a gentle slope to a more considerable level of learning.

The tragedy is that science, mathematics, and computer literacy will increasingly become a requirement for almost all employment.

We run the risk of condemning an entire generation to a lifelong estrangement from the very science and technology that will inevitably govern their lives.

## **Response 2: Values**

Themes of the the past

We hear voices of concern -- whether from the academy, the foundations, or Washington -- or, as some put it, spanning the range from Bloom to Bloom County...

Alan Bloom...

Condemns the cultural and ethical relativism he sees in American youth...

Their music, lifestyles, careerism

Laments lack of shared goals...

loss of a secure religious foundation

lack of familiarity with classical texts

decay of moral education

"Our young people lack an understanding of the past and a vision for the future; they live in an impoverished present. Our universities, entrusted with their education, no longer provide the knowledge of the great tradition of philosophy and literature that made students aware of the order of nature and their place in it. Higher education fails to arouse or to nurture the self-knowledge that has always been the basis for serious humane learning."

Bennett: "Students deserve a university's real and sustained attention to their intellectual and moral well-being."

There is almost a sense that our universities have embraced a new type of philosophy of "literalism" first articulated earlier this year by Opus...

"You're born...

You live...

You go on a few diets...

You die."

But all too often I fear these voices also call for a return to a style of education characterizing our past...

Of course, key in this debate is a suggestion that we must move beyond focusing simply on intellectual values in the education we provide...

Intellectual

The seeking of wisdom

Discipline of the mind

Respect for reasoned conclusions

Intellectual integrity

Freedom of inquiry

Character

Honesty

Integrity

Truthfulness

Nonviolence

Tolerance

Social

Compassion, Caring, Kindness

Tolerance and respect

Collegiality, civility, and community

It is these latter values that are so essential to Michigan students because of the special role you will play in our

society.

### **Response 3: The Preparation for Leadership**

As I noted earlier, you are an extraordinarily talented group of individuals...

It is likely that regardless of what happens during your college education, you will go on to become leaders of our society...

Hence, we believe it important that you prepare for this life of leadership now by taking advantage of all that this University has to offer.

John Gardner suggests some of the key themes:

1. A commitment to the fulfillment of human possibilities.

The release of human potential is and must always be a central value.

Serious and sustained attention to the special problems of justice to historically deprived groups is essential.

2. Creating a sense of community

Shared values and goals are the chief resources leaders can count on in motivating people--the task grows difficult--eventually impossible--as shared values disintegrate.

You should strive to participate in and experience a sense of community on this campus.

3. Renewal

Leaders have to be capable of self renewal, and capable of helping in the renewal of the systems over which they preside.

Must learn to balance continuity and change.

4. Hope

Human beings are creatures who cheerfully act against the odds if they believe strongly enough, who reach for the unreachable stars and dream of impossible victories.

We must help young, potential leaders to value and to understand this side of our nature.

5. Discipline of the Mind

The central task of a university, a task which separates it from all other social institutions, is the creation of an environment where the quality of mind and of

its performance is always the central concern.

The spirit most likely to develop leaders is a disciplined use of reason, enlivened by daring and the courage to experience, and tempered by respect for what we can learn from others.

#### 6. Acceptance of Responsibility...

From the earliest moments in our long history, the UM has been known for a spirit of democracy and tolerance among its students and faculty.

Over a century ago, Harpers Weekly noted:

"The most striking feature of the University of Michigan is the broad and liberal spirit in which it does its work."

Student activism and involvement have always been an important part of the learning process at Michigan.

Yet, while it is of paramount importance that we protect the fundamental freedom of students and faculty to explore new ideas and concepts, to state their beliefs and values, no matter how far they may be from mainstream thought...

...it is also essential to recognize that without the acceptance of responsibility, freedom is meaningless.

Indeed, true leadership consists not of simply protesting the existence of a problem...but rather consists of doing something positive about it.

out against injustice

In a very real sense, I hope that you will make a positive commitment to address the challenges before our society and not be content simply with complaining...

Theodore Roosevelt

"It is not the critic who counts, nor those who point out how the strong stumbled or where the doer of deeds could have done better."

"The credit belongs to those who are actually in the arena; whose faces are marred by dust and sweat and blood; who strive valiantly; who err and come up short again and again; who know the great enthusiasms, the great devotions, and spend themselves in the worthy cause; who, at the

best, know in the end the triumph of high achievement; and who, at the worst, if they fail, at least fail while daring greatly, so that their place shall never be with those cold and timid souls who know neither victory or defeat."

**What are we trying to do at Michigan?**

Prepare you for a career?...

As doctors, lawyers, engineers,  
...investment bankers???

Well, we will do our best, but that is not our real mission...

These challenges suggest that the principal focus of an undergraduate education appropriate for the 21st Century will be the goal of liberal learning... that is, a liberal education as the preparation for a lifetime of learning.

**Perhaps Emerson put it best in his famous**

address at Harvard almost exactly 150 years ago:

"Colleges have their indispensable office, to teach elements. But they can only serve us when they aim not to drill but to create; when they gather from far every ray of various genius to their hospitable halls, and by the concentrated fires, set the hearts of their youth aflame..."

**And, that is our real purpose...**

To ignite the intellectual fires within each of our students...

**We want to stimulate in each of you a spirit of**

liberal learning...a spirit that will be with you for the rest of your lives...