



Preparing Globally Competent Students in Science, Technology, Engineering, and Mathematics (STEM)

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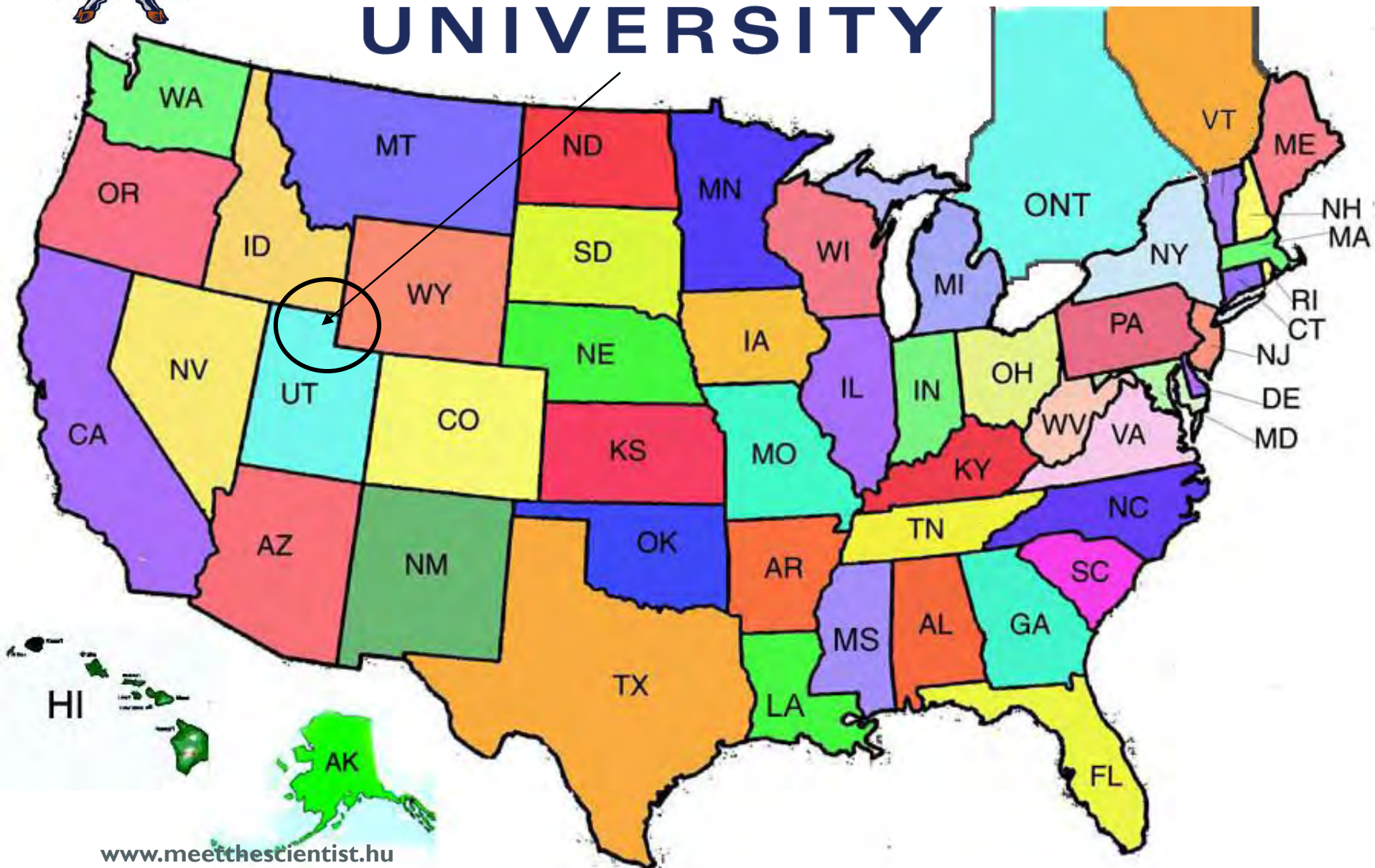
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I. Introduction



I. Introduction

- Students in **STEM** throughout the world **must be prepared to live and work in our 21st century global society**
- The world is increasingly becoming **more globalized and interconnected** every day.



I. Introduction

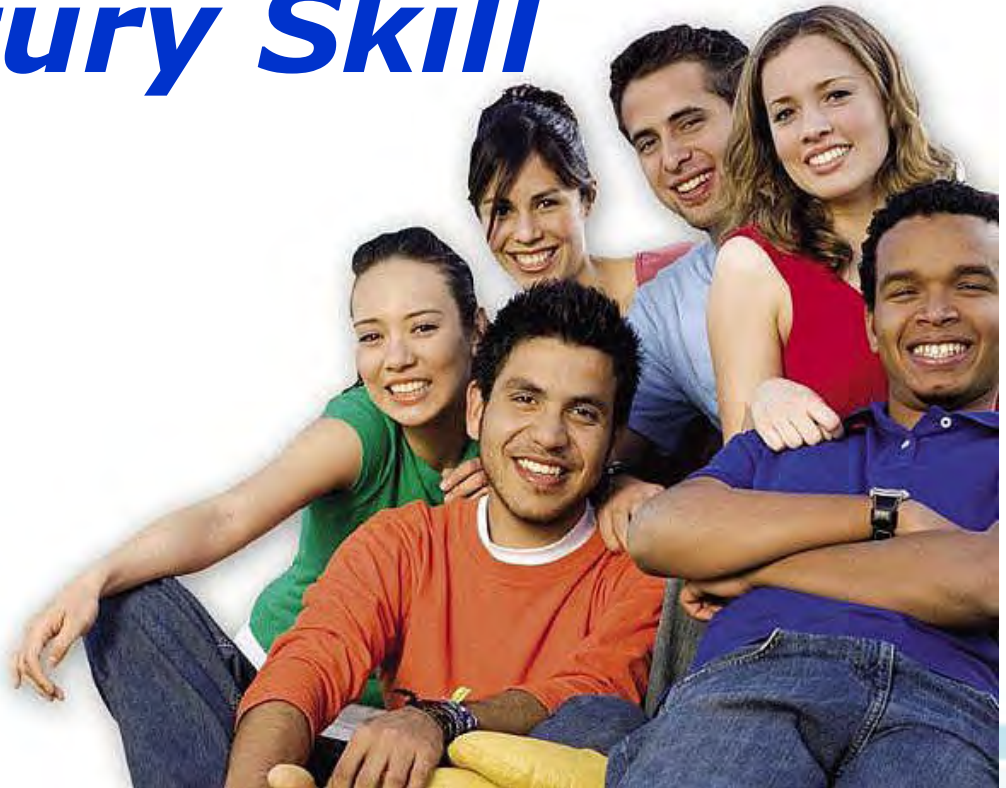
Today's STEM graduates are **competing for jobs and opportunities** on a global scale with their neighbors from **around the world.**



I. Introduction

Thinking Globally is a 21st Century Skill

**You Need to Be
Prepared to Live
and Work in the
21st Century**



I. Introduction

***STEM
Professionals
will all need to
work together
to help solve
many of today's
global problems.***



**Biggest jump ever seen in
global warming gases**

The world pumped about 564 million more tons (512 million metric tons) of carbon into the air in 2010 than it did in 2009.

That's an increase of 6%.

II. Terminology



II. Terminology

- **Science**
- **Technology**
- **Engineering**
- **Mathematics**
- **Globalization**
- **Global Competency**



SCIENCE

- **Science** is the study of the **natural world** that includes observable and measurable phenomena within the universe.
- **Science** is a tool to understand objectively the ever-changing, natural world in which we live.



TECHNOLOGY

- **Technology** is the **modification of the natural** world to meet human wants and needs.
- **Technology** is more than just **computers.**
 - It is innovation in action.
 - It involves using **creativity** to help make our lives better
 - ***The Next Trend: Cloud Computing***



TECHNOLOGY: *The Near Future*

- **Batteries:** Used in electronic devices. They will get smaller, lighter and last 10 times longer than they do today.
 - The range of electric cars will extend up to 300 miles (482km) from the current 100 (160km).
- **Sensors:** Sensors in your phone, car, wallet, etc., will collect data that give scientists a real-time picture of your environment.
 - A whole class of "citizen scientists" will emerge, using simple sensors that already exist to create massive data sets for research.
- **Flexible Video Screens**



Technology is Everywhere!



Think about the Technology You Used Today - Did You:

- Talk or Text on a Cell Phone?
- Used a Computer & Internet?
- Watch Television?
- Ride in a Car or Bus?
- Take food from a Refrigerator?

Technology Improves our Lives -- But can also Can Create Problems!

TECHNOLOGY



**Technology Can
Give Us
Information
Overload**



TECHNOLOGY

The Global Youth Movement



You're the **Millennial Generation** & You're **Digital Natives** (Grown up with Digital Technology)

- You **Think Differently**: *Multitask All the Time, Prefer to Cut and Paste, etc.*
- You're skilled at using **Digital Technology**: *mobile phones, computers, the Internet, gaming devices, iPods, etc.*
- You are **Connected** (Web 2.0): *Social Networking, Sharing, Changing Content, etc.*



WIKIPEDIA
The Free Encyclopedia



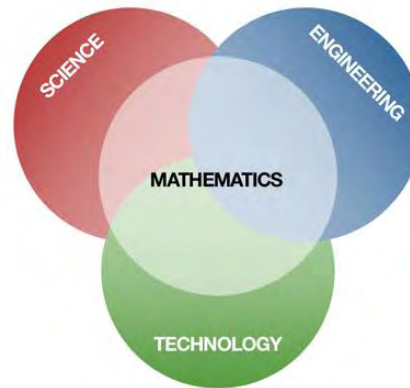
ENGINEERING

- **Engineering** is the profession in which a knowledge of the **mathematical** and **natural sciences** gained by study, experience, and practice is **applied** with judgment to develop ways to utilize economically the materials and forces of nature for the **benefit of humankind.**



MATHEMATICS

- **Mathematics** is the science of **patterns and relationships**.
- **Mathematics** provides an **exact language** for technology, science, and engineering.



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GLOBALIZATION

Globalization is a process of interaction & integration among the people, companies, and governments of different nations.

It is a process driven by international trade & investment and aided by information technology.



GLOBALIZATION

One of the principle drivers of globalization is Technology.

- **Information and Communication Technology**

The Internet has connected the World.

- **Transportation Technology**

Has made it easier to move people and goods around the world.



GLOBAL COMPETENCY

- ***Understanding the World Around You!***
- Knowing there are various people from around the world and that they are different from you.



The World's Population Just Surpassed 7 Billion People!

Justin Bieber - Baby ft. Ludacris

JustinBieberVEVO

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JOJO "DISASTER"

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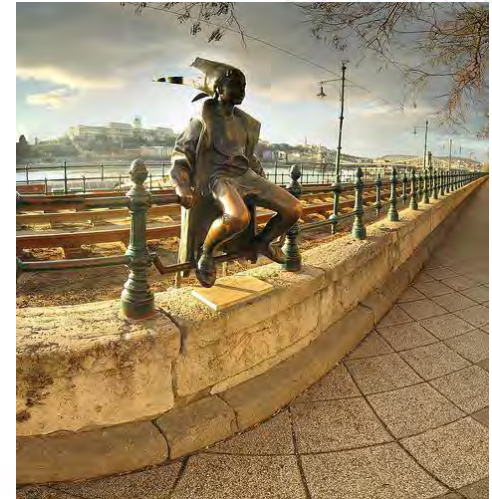
GLOBAL COMPETENCY

Knowing that you live in a world consisting of people who have different:

- **Beliefs**
- **Languages**
- **Lifestyles**
- **Religions**
- **Customs**
- **Currency**
- **Political Surroundings**



Photo: Royal Thai Fine Arts Department



GLOBAL COMPETENCY

Globally Competent Graduates in STEM should:

1. Have a diverse & knowledgeable **worldview**.
2. Comprehend the **international dimensions** of their major field of study.
3. **Communicate effectively** in another language and/or cross-culturally.
4. Exhibit **cross-cultural sensitivity** and adaptability.
5. Carry global competencies **throughout life**.



III. The Need



III. The Need

Why do we need to prepare globally competent students in Science, Technology, Engineering, and Mathematics (STEM)?

Because of:

- 1. Globalization**
- 2. Changes in Science & Technology** 
- 3. Global Issues in Science and Technology**

America is Losing Ground in its Global Competitiveness



III. The Need - Globalization

It is changing the world in which we live and forcing us to be able to:

- *Communicate with One Another*
- *Live with One Another*
- *Unite Our Interests Together*



III. The Need - Globalization

The Effects of Globalization Can Be Seen Everywhere:

- Electronics
- Automobiles
- Furniture
- Clothes
- Household Goods
- Food



III. The Need - Globalization



Is it good or bad?



III. The Need

Changes in Science & Technology



- **The 24-Hour Workday:** U.S. companies each morning receive software that was written in India overnight in time to be tested in the U.S. and returned to India for further production that same evening.
- **Call Centers:** Many U.S. firm's call centers are based in India and the Philippines — Employees are now being taught to speak with a mid-western accent.



III. The Need

Changes in Science & Technology



- For the cost of 1 engineer in the U.S. a company can hire 11 in India.
- America has been depending heavily on foreign-born talent.
 - 38% of the scientists and engineers in America holding doctorates were born abroad.
 - In 2003 foreign students earned 59% of the engineering doctorates awarded in U.S. universities.



III. The Need

Changes in Science & Technology



- Chemical companies closed 70 facilities in the U.S. in 2004, and have tagged 40 more for shutdown. Of 120 new chemical plants being built around the world with price tags of \$1 billion or more, 1 is in the U.S., 50 are in China.



- In 1997 China had fewer than 50 research centers managed by multinational corporations. By 2004 there were over 600.

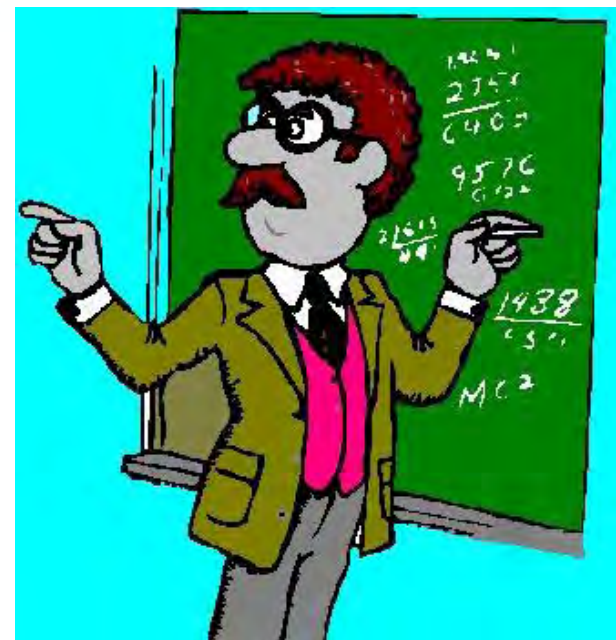


III. The Need

Changes in Science & Technology



- In a recent international test involving mathematical understanding, U.S. students finished in 27th place among the nations participating.
- About two-thirds of the students studying chemistry and physics in U.S. high schools are taught by teachers with no major or certificate in the subject.



Science, Technology, Engineering, and Mathematics (STEM)



- We need to provide our children (K-12) with an education that includes a **solid foundation in STEM** and encourage students to pursue careers in STEM-related fields.
- Today, maintaining a citizenry that is well versed in the **STEM fields** is a key portion of the public education agenda of the USA.
- Professionals in the STEM fields work together to make all our lives better.

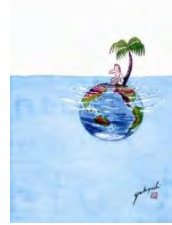


III. The Need

Global Issues in Science & Technology



- **Global Warming**
- **Acid Rain**
- **Air and Water Pollution**
- **Ozone Depletion**
- **Municipal Waste and Landfills**
- **Rainforest Destruction**



III. The Need

Global Issues in Science & Technology



- **Extinction of Species**
- **Depletion of Natural Resources**
- **Clean Drinking Water**
- **Food Security**
- **Responding to Natural Disasters** (e.g., earthquakes, tsunamis, and hurricanes)
- **Global Health Concerns**



Big cats may be extinct by 2031



III. The Need

Global Issues in Science & Technology



Many Global Issues,
and Problems in the
World will need to be
solved by Professionals
in STEM

(You)



IV. Strategies



IV. Strategies - What You Can Do!

To Become Globally Competent Students in Science, Technology, Engineering, and Mathematics (STEM), YOU need to:

- 1. Learn About the World** – *You are a Citizen of the World*
- 2. Learn About the Global Problems and Issues in STEM** - *Become a Good Problem Solver*
- 3. Challenge your Instructors** - Challenge them to Provide You with Global Perspectives on the Content Being Studied



IV. Strategies

What You Can Do I. Learn About the World



You Must Learn About the World – A World Where You Will be Competing With Others from Around the Globe



IV. Strategies

What You Can Do I. Learn About the World

Learn About the World



World Problems



Standards



Currency



Cultures



Languages

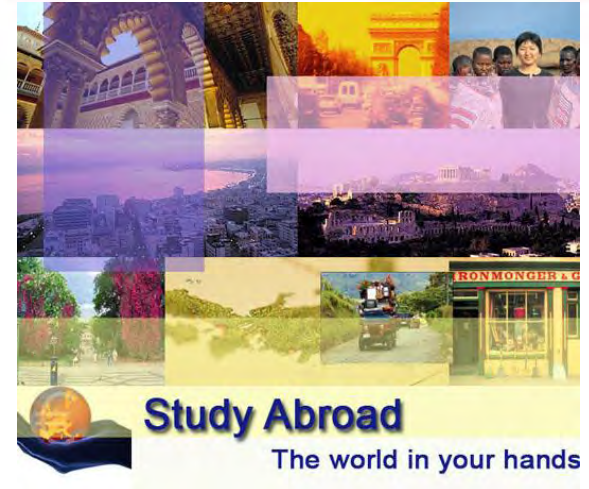


Food

IV. Strategies

What You Can Do I. Learn About the World

- **Travel (Study Abroad)**
 - Fulbright
- Participate in **International Related Events** in your own Community
 - Visiting Speakers, Conferences, Fairs, etc.
- **The Internet**
 - Virtual Field Trips, News & Events, etc.
- Seek out **International References** & Viewpoints



IV. Strategies

What You Can Do 2. Learn About Global Issues

What Are Global Issues?

An issue is likely to be global if it:

- persists or is long-acting
- is transnational or transboundary
- affects large number of people
- is an underlying cause of events
- is connected to other issues that meet these criteria.

Global Issues in Science: Sustainability, Ecology, Cell Biology, Genetics, and Evolution.





UNITED NATIONS

We the peoples... A stronger UN for a better world.

Peace and Security

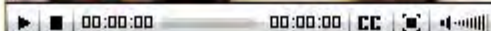
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As global population hits 7 billion, UN urges action to ensure development for all



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WHAT'S NEW :: Today is: Thursday, October 27

October 20, 2011 - Many people know that Canada's national symbol is the maple leaf, but did you realize that Ukraine's is the trident or that India's is the Bengal tiger? Most countries' major national representation(s) may now be found in the new "National symbol(s)" field in the Government category.

October 13, 2011 - In the Economy category, information for "Exports - partners" and "Imports - partners" has been updated to show data for 2010.

October 06, 2011 - Have you ever wanted to explore Machu Picchu, the lost city of the Incas? Check out the new photos in the Peru entry (Nos. 8-28) to get a virtual tour!

September 28, 2011 - The World Factbook is expanding! The People category is now People and Society and includes eight new fields: Health expenditures (as percent of GDP), Physicians density (per 10,000 people), Hospital bed density (per 1,000 people), Maternal mortality rate (deaths per 100,000 live births),

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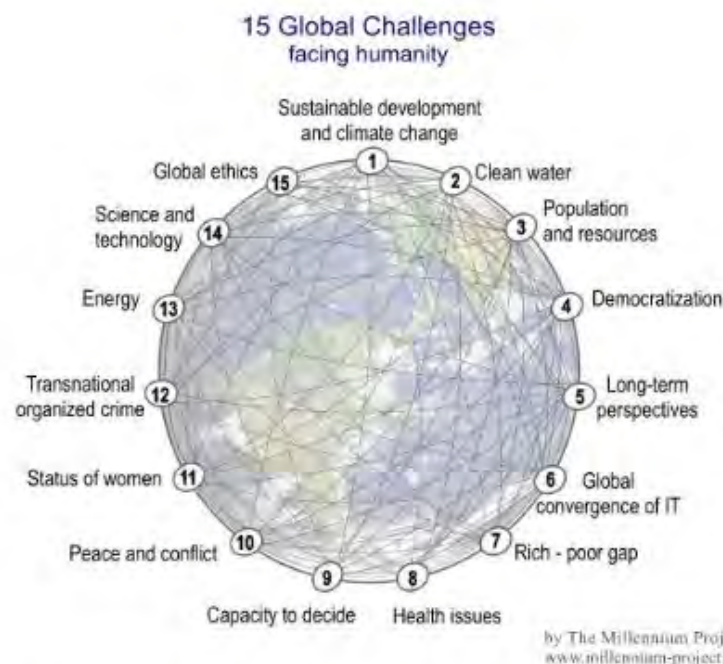
Global Challenges for Humanity

- excerpt from 2011 *State of the Future* -

Also available 15 Global Challenges-[Spanish Translation](#).

The 15 Global Challenges updated annually continue to be the best introduction by far to the key issues of the early 21st century.

-- Michael Marien, editor, *Future Survey*

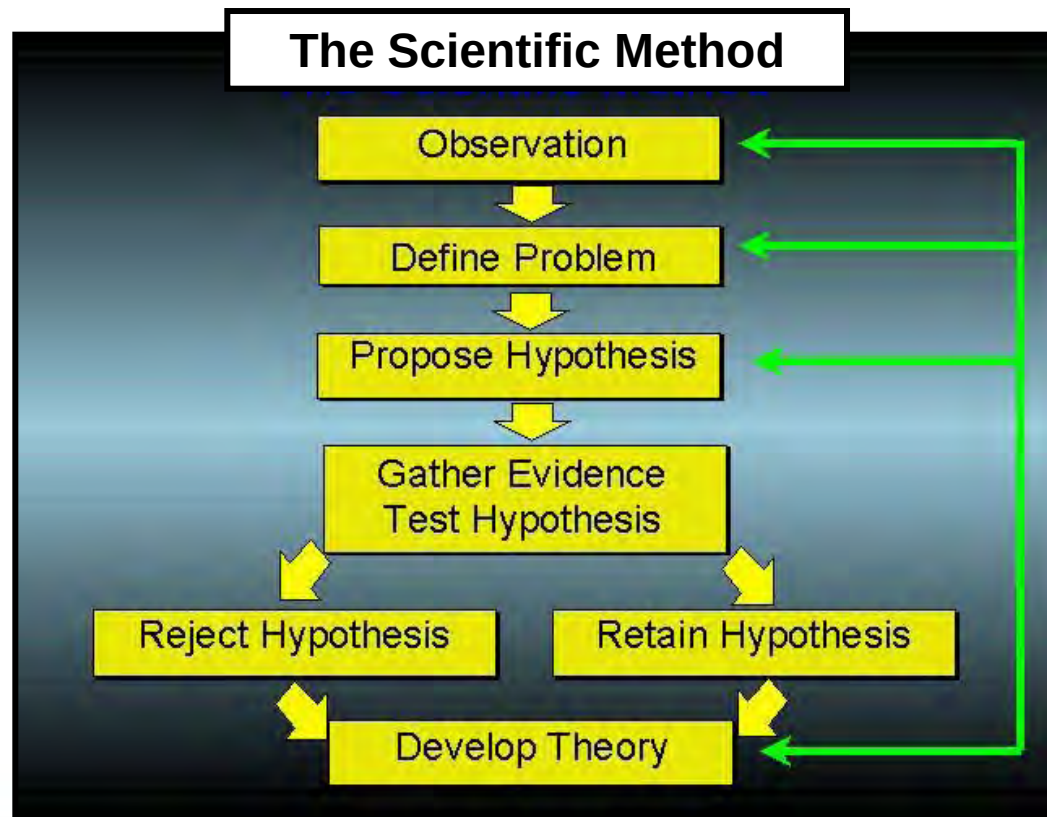


The 15 Global Challenges provide a framework to assess the global and local prospects for humanity. Their description, with a range of views and actions to address each, enriched with regional views and progress assessments are updated each year since 1996 and published in the annual *State of the Future*. The short description of the challenges appears in the print version of the report, while a detailed, more complex one is on the CD that accompanies the report. The detailed version of the Global Challenges available in the CD's Chapter 1 are totaling over 1,300 pages. For each Challenge, there is a more comprehensive overview, alternative views or additional comments from participants on the overview, regional perspectives and relevant information from recent literature, a set of actions with a range of views from interviews with decisionmakers to address the challenge, additional actions and views on those actions, and suggested indicators to measure progress or lack thereof.

IV. Strategies

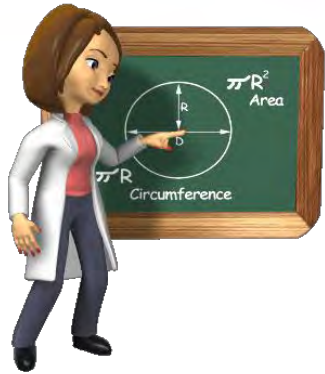
What You Can Do 2. Learn About Global Issues

Become Good Problem Solvers & Learn How to Apply the Scientific Method



IV. Strategies

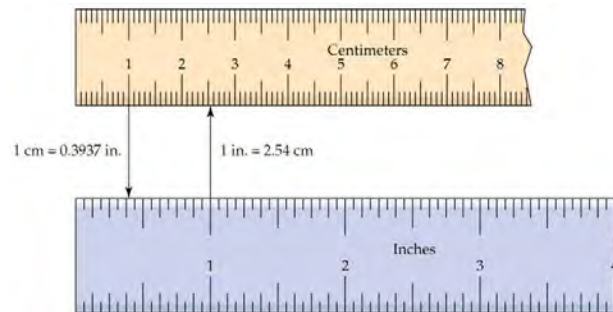
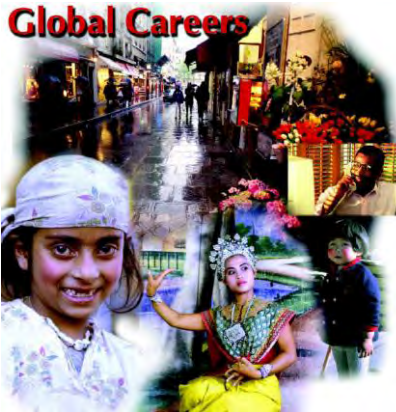
What You Can Do 3. Challenge Your Instructors



Challenge your Instructors to Provide You with “Global Perspectives” to the Subject or Topic being studied.



Global Careers



Summary

Today, You are all
Children of the World

Learn About It

Respect It

Work to Make it a
Better Place to
Live and Work for
all its People



REMEMBER: One Person Can Make A Difference!





Thank You!
Köszönöm!

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Questions? Kérdések



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