


Retooling CTE in Michigan

Dr. Kitty Manley, Professor
 Ferris State University
 Director, Michigan Center for CTE



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High School Teacher




Business Education


- USA
- Iran




College Administrator



Instructional Coordinator
 Dalton Junior College



Asst. Vice President for Curriculum & Instruction,
 Ferris State University



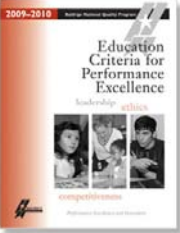
Research Specialist



The National Center for Research in Vocational Education




Baldrige National Quality Award



Four years at National Level Examiner

Eight years at State

- Examiner,
- senior examiner
- Lead senior examiner
- Board of judges





Teacher Educator

Master of Science in Career & Technical Education

Cooperative Ph.D. in CTE with Western MI Univ.

12 Credit Certificate in TQM for Education built around the Baldrige

The screenshot shows the homepage of the Michigan Center for Career and Technical Education (MCCTE). At the top, it features the organization's name and logo, along with navigation tabs for Home, About, Programs, Publications, Resources, and Key Issues. The main content area includes a 'Home MCCTE' banner with a map of Michigan, a 'What's new at MCCTE' section with recent news items, and several sidebar sections: 'About' (Background, Contact Information, Our Staff), 'Programs' (Curriculum Standards Project, CPD Workshops, Webcast), 'Publications' (Publication Resources, Our Publications, Best Practices), 'Resources' (Power Points, Perkins 2006 Legislation, MAIVE Reports), 'Key Issues' (Non-Traditional Student Enrollment), 'Curriculum Standards Project' (Career Clusters, View Curriculum Standards, Directions for Completing the Gap Analysis, Power Point Slides), 'Messaging Events' (No events scheduled), 'State of Michigan' (Office of Career and Technical Education), and 'General Contact' (Michigan Center for Career and Technical Education, Ferris State University, Bishop Hall, 1348 Cramer Circle, Big Rapids, MI 49307, Telephone: 888.591.2789, Fax: 231.591.2043).

Consultant--Clients Include...

- Robert Bosch
- General Mills
- Toyota Motor Mfg
- Caterpillar
- Hershey
- Walt Disney World
- Kellogg
- Nestle
- Coca Cola
- Lucent Technologies
- Miller
- Nestle
- Quaker
- Phihip Morris
- 3M
- AC Delco
- Sappi Fine Paper
- Quaker—Gator Aide
- Delphi

Michigan CTE At A Crossroads

2/8/2010

Building a Burning Platform

2/8/2010

Retool verb

- to replace or rearrange the tools and machinery of (a factory).

2/8/2010

Retool verb

- to reorganize or rearrange, usually for the purpose of updating:
 - to retool the industrial organization.

2/8/2010

“The core problem is that our education and training systems were built for another era. We can get where we must go only by changing the system itself.”

Tough Choices and Tough Times, New Commission on the Skills of the American Workforce (2007)

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Bill Gates

“American high schools are obsolete.”

By obsolete, I mean that our high schools, even when they are working exactly as designed, cannot teach our kids what they need to know today.

Training the workforce of tomorrow with high schools of today is like trying to teach kids about today’s computers on a 50-year-old mainframe.

It’s the wrong tool for the times.”

-Bill Gates, February 2005

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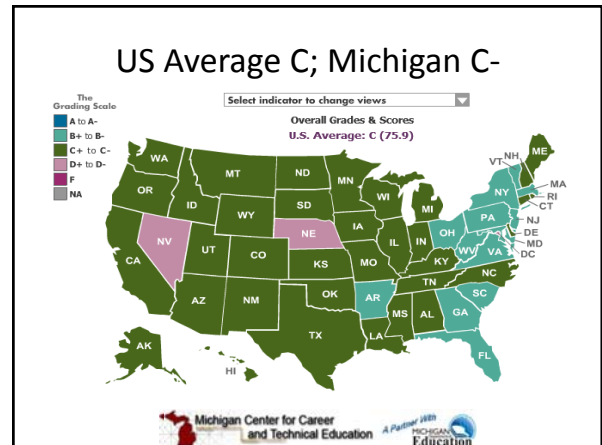
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Retool Strategy 1

Use CTE to Improve Academic Test Score

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The purpose of the Perkins IV is to prepare a workforce with **the academic** and vocational skills needed to compete successfully in a world market.

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For ALL Students

Rigor

Relevance

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Knowledge Taxonomy

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Application Model

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Rigor/Relevance Framework

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Levels

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Rigor/Relevance Framework

6	<ul style="list-style-type: none"> Analyze the graphs of the perimeters and areas of squares having different-length sides. Determine the largest rectangular area for a fixed perimeter. Identify coordinates for ordered pairs that justify an algebraic relation or function. Determine and justify the similarity or congruence for two geometric shapes. 	<ul style="list-style-type: none"> Obtain historical data about local weather to predict the chance of snow, rain, or sun during year. Test consumer products and illustrate the data graphically. Plan a large school event and calculate resources (food, decorations, etc.) you need to organize and hold this event. Make a scale drawing of the classroom on grid paper, each group using a different scale.
3	<ul style="list-style-type: none"> Express probabilities as fractions, percents, or decimals. Classify triangles according to angle size and/or length of sides. Calculate volume of simple three-dimensional shapes. Given the coordinates of a quadrilateral, plot the quadrilateral on a grid. 	<ul style="list-style-type: none"> Calculate percentages of advertising in a newspaper. Tour the school building and identify examples of parallel and perpendicular lines, planes, and angles. Determine the median and mode of real data displayed in a histogram Organize and display collected data, using appropriate tables, charts, or graphs.

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Rigor/Relevance Framework

6	<ul style="list-style-type: none"> Analyze the graphs of the Express probabilities as fractions, percents, or decimals. Classify triangles according to angle size and/or length of sides. Calculate volume of simple three-dimensional shapes. Given the coordinates of a quadrilateral, plot the quadrilateral on a grid. 	<ul style="list-style-type: none"> Obtain historical data about local weather
3	<ul style="list-style-type: none"> Express probabilities as fractions, percents, or decimals. Classify triangles according to angle size and/or length of sides. Calculate volume of simple three-dimensional shapes. Given the coordinates of a quadrilateral, plot the quadrilateral on a grid. 	<ul style="list-style-type: none"> Determine the median and mode of real data displayed in a histogram Organize and display collected data, using appropriate tables, charts, or graphs.

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Rigor/Relevance Framework

- Calculate percentages of advertising in a newspaper.
- Tour the school building and identify examples of parallel and perpendicular lines, planes, and angles.
- Determine the median and mode of real data displayed in a histogram
- Organize and display collected data, using appropriate tables, charts, or graphs.

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According to the NAEP, a majority of 9th graders in low-performing high schools begin their freshman year with significant reading difficulties.

Poor reading ability is a **key predictor** of academic disengagement and, ultimately, dropping out.

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Achievement Flat or Declining in Reading, 17 year olds, NAEP

Source: NAEP 2004, Trends in Academic Progress

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African-American Students by State Reading

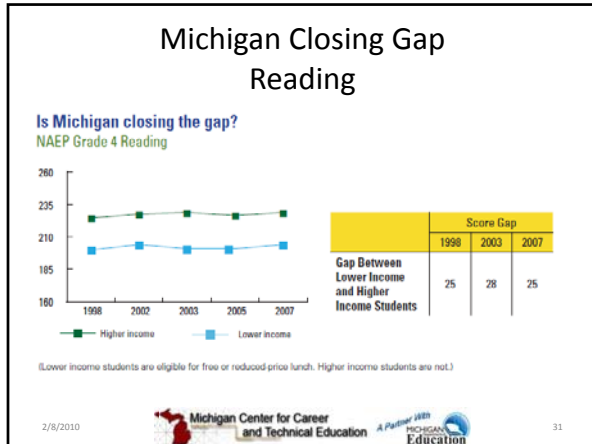
How does the reading performance of African-American students compare across states?
2007 NAEP Grade 4 Reading Average Scale Score

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Latino Students by State Reading

How does the reading performance of Latino students compare across states?
2007 NAEP Grade 4 Reading Average Scale Score

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Lexile Scale on 2000 points

- Semantic difficulty (frequency and difficulty of individual words)
- Syntactic complexity (length of sentence, paragraph, passage)

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Lexile Literature

1500	On Ancient Medicine
1400	The Scarlet Letter
1300	Brown vs. Board of Ed.
1200	War and Peace
1100	Pride and Prejudice
1000	Black beauty
900	Tom Swift in the Land of Wonders
800	The Adventures of Pinocchio
700	Bunnicula: A Rabbit Tale of Mystery
600	A Baby Sister for Frances
500	The Magic School Bus Inside the Earth
400	Frog and Toad are Friends
300	Clifford's Manners

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Lexile Textbooks

1500	The Making of Memory: From Molecules to Mind, Doubleday
1400	Philosophical Essays, Hackett Publishing
1300	Psychology: An Introduction, Prentice Hall
1200	Business, Prentice Hall
1100	America: Pathways to Present, Prentice Hall
1000	Writing and Grammar Gold Level, Prentice Hall
900	World Cultures, A Global Mosaic, Prentice Hall
800	Word 97, Glencoe/McGraw Hill
700	World Explorer: The US and Canada, Prentice Hall
600	Science (Grade 4), Addison-Wesley
500	People and Places, Silver Burdett Ginn
400	Imagine That! Scholastic Inc.
300	My World, Harcourt Brace

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NAEP

Grade 12	1150
Grade 8	990
Grade 4	820

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Other tests...

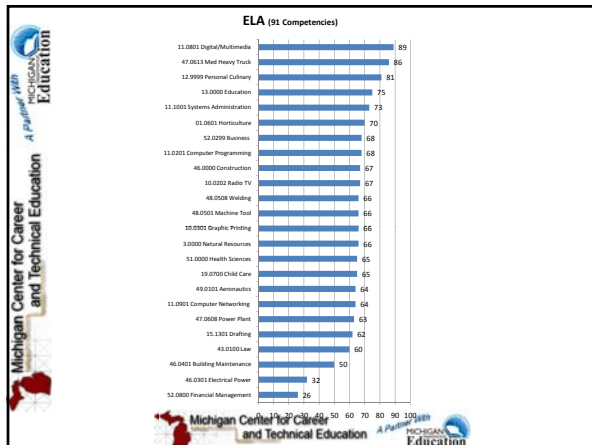
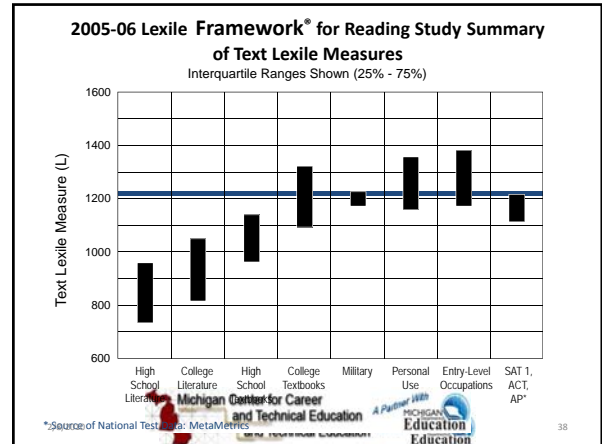
GMAT	1440
CPA	1430
LSAT	1380
MCAT	1330
ASVAC	1230
ACT	1210
GED	1060

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Lexile Jobs

1290	Medical Sales Representative
1250	Auto Sales Representative (used car salesman)
1240	LPN I
1220	Carpenter
1180	Bookkeeper
1050	Chef
960	Auto Mechanics

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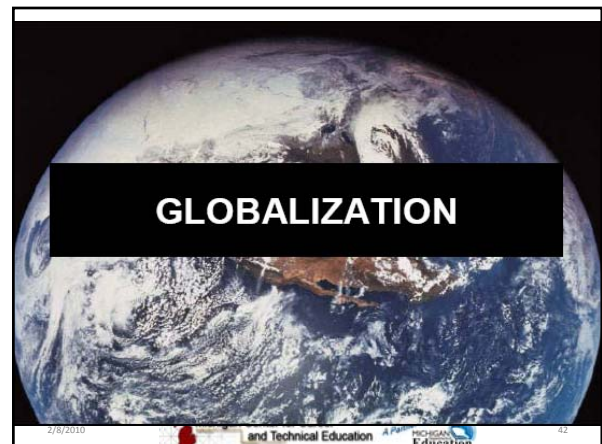
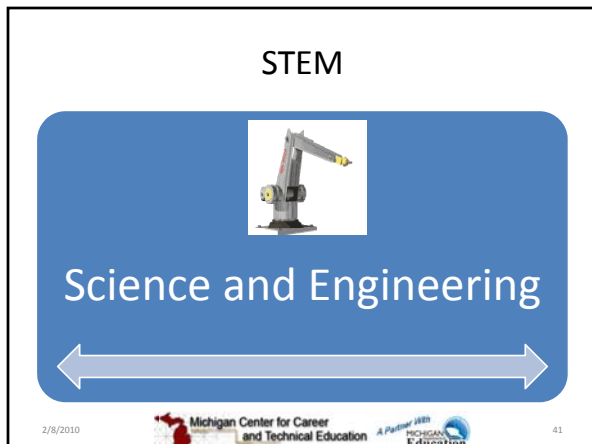


TODAY'S EMPLOYERS SEEK

STEM

Science Technology Engineering Math

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Global Crisis

“A Nation At Risk” (1983) warned

- Improve math and science or risk falling behind global competitors
- None of the recommendations implemented

Result

- American students are no longer “at risk”, they are now clearly behind even third world students in India and China
- Behind developing countries

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Global Competitiveness

In the 1980s, Japan was America’s leading global competitor.

- Today, the competition has extended to India, China, Eastern Europe, and beyond.

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The decline of American enrollment in the science and engineering fields concurrent with the increasing demand for professionals in these fields places the United States at a huge disadvantage in the global marketplace.

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International Competition

Students Enrolled in Postsecondary
(in millions)

	1990	2000	% Change
U.S.	13.7	15.7	+15%
China	3.8	13.6	+258%
India	4.9	9.4	+92%

UNESCO, 2003

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International Competition

New Participants in the World Economy

China, India and Russia = 3 billion people

10% highly educated = 300 million people

USA = 300 million people

25% highly educated = 75 million

2/8/2010 Craig Barrett, MNCIE, 2004 Michigan Center for Career and Technical Education A Partner With MICHIGAN Education 47

The Global Challenge of Intellectual Capital

Bachelors Degrees in Engineering, US (citizens and permanent residents) and Asia (China, Japan, Korea)

Linear Plot

2/8/2010 Source: Ray Kurzweil, 2005 Michigan Center for Career and Technical Education A Partner With MICHIGAN Education 48

The Global Challenge of Intellectual Capital

Percent of Bachelor's Degrees that are awarded in engineering:

- China 60%
- Taiwan 41%
- South Korea 33%
- USA 31%

• Source: Friedman, The World is Flat, 2005


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China will soon become the number one English-speaking country in the world.




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During the course of this presentation . . .




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60 babies • will be born in the U.S.

244 babies • will be born in China.

351 babies • will be born in India.



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The 25% of the population of China with the highest IQ's

Is greater than the total population of North America

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Translation for our CTE teachers

China has more honors kids than we have kids

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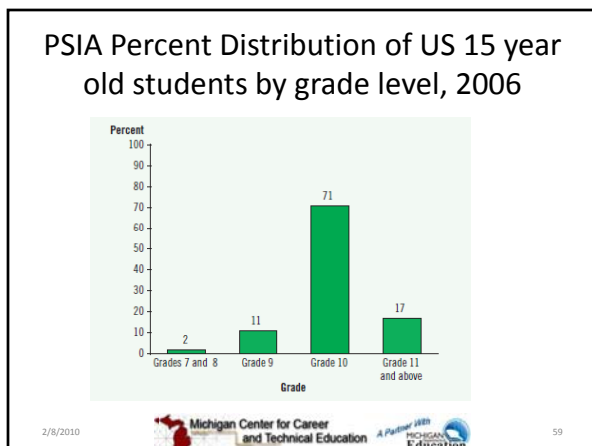
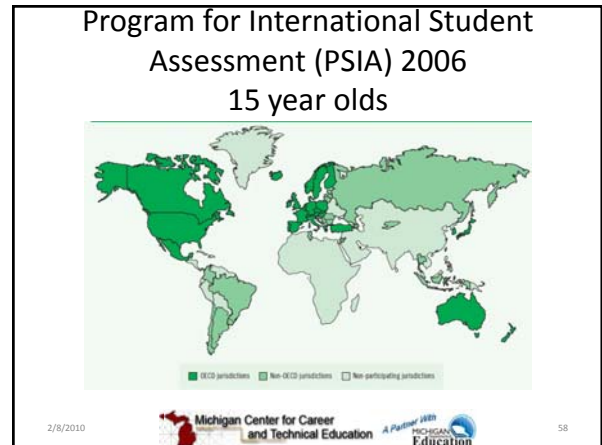
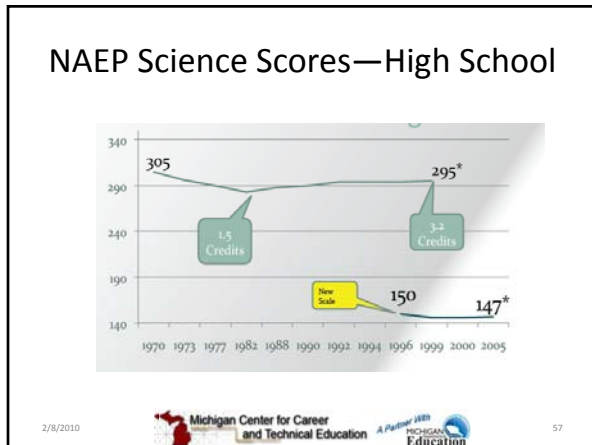
If you took every single job in the U.S. today and shipped it to China...

It would still have a **labor surplus**

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I do project....I do project!!!

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Average Scores of 15 year old students on combined science literacy scale by country

Organization for Economic Co-operation and Development (OECD) Average 500

Finland	563
Canada	534
Japan	531
New Zealand	530
Australia	527
Netherlands	525
Korea, Republic of	522
Germany	516
United Kingdom	515
Czech Republic	513
Switzerland	512
Austria	511
Belgium	510
Ireland	508
Hungary	504
Sweden	503
Poland	498
Denmark	496
France	495
Iceland	491
United States	489
Slovak Republic	488
Spain	488
Norway	487
Luxembourg	486
Italy	475
Portugal	474
Greece	473
Turkey	424
Mexico	410

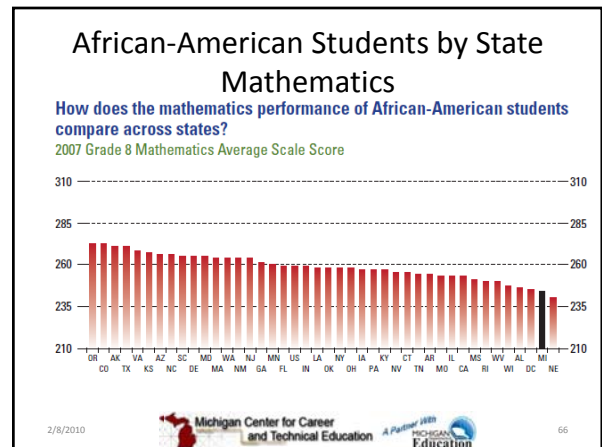
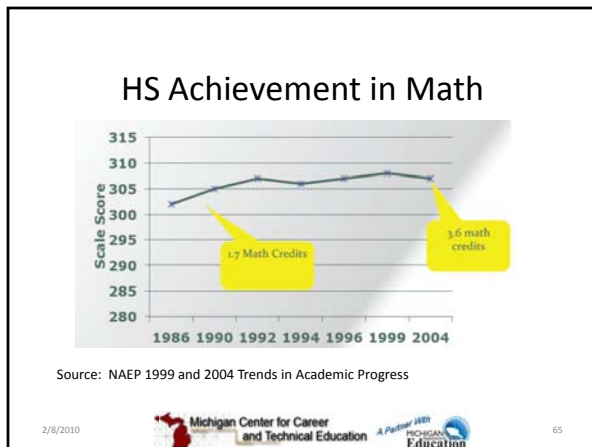
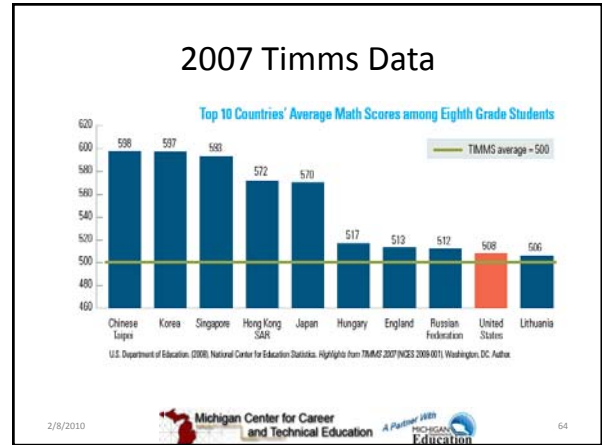
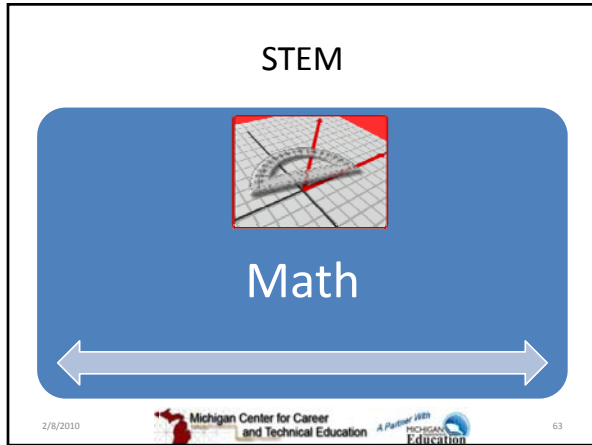
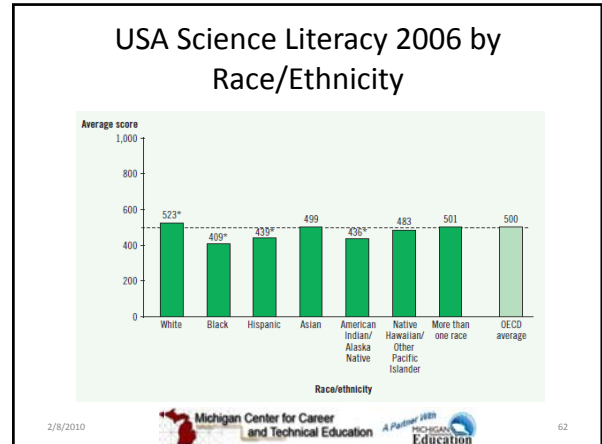
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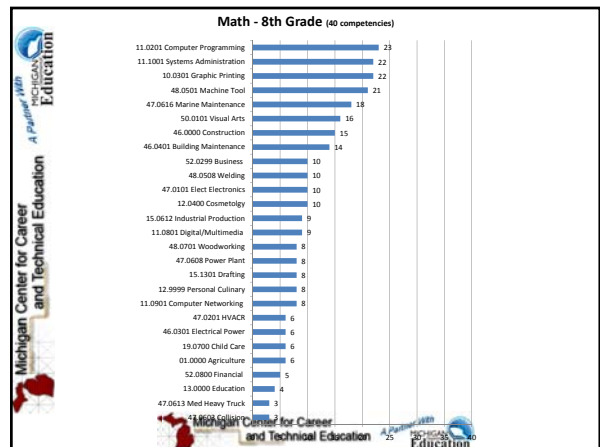
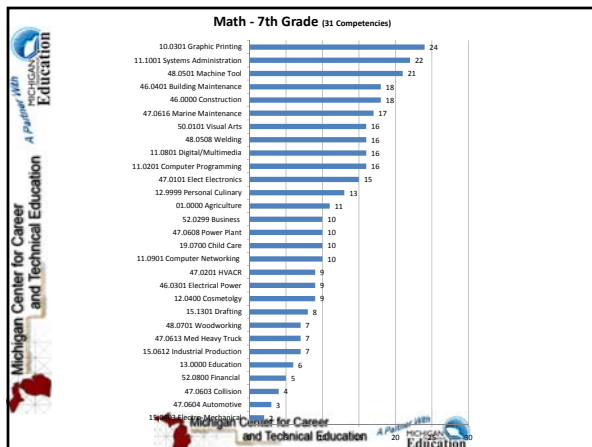
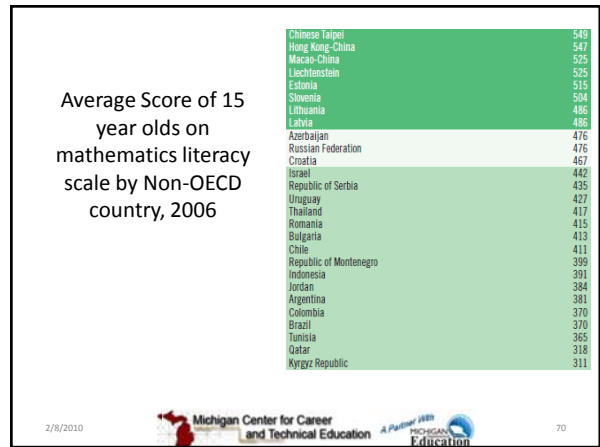
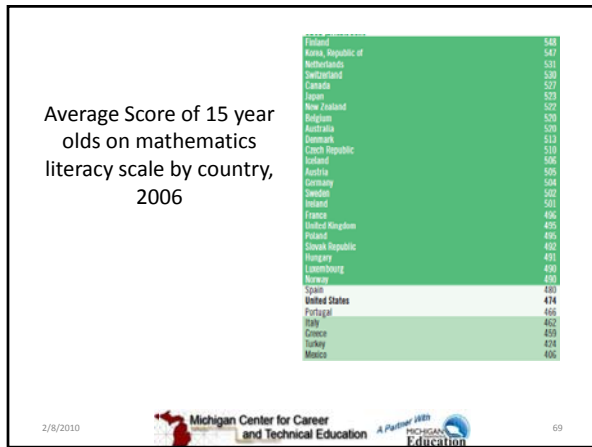
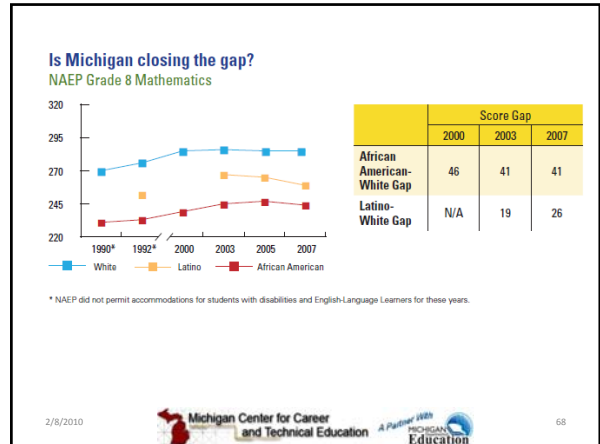
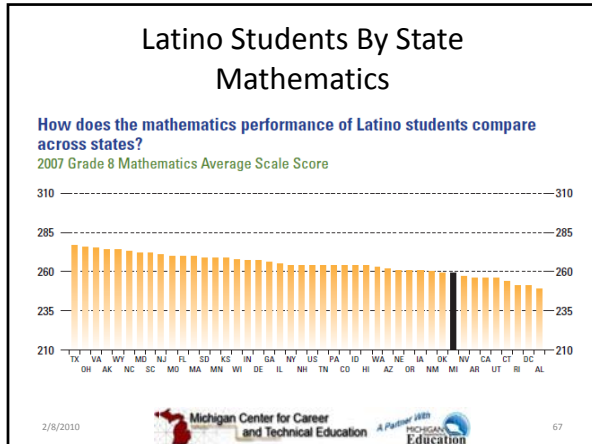
Science Literacy Scale

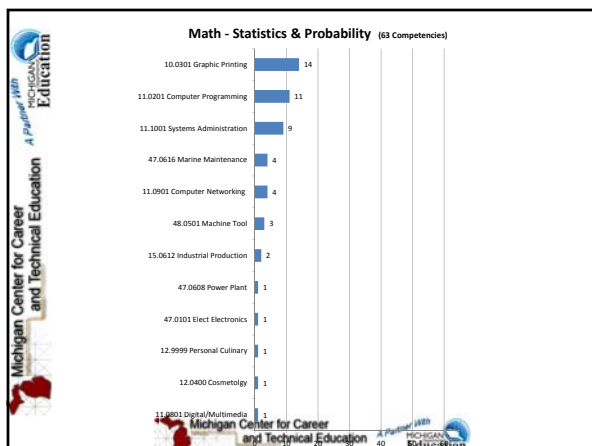
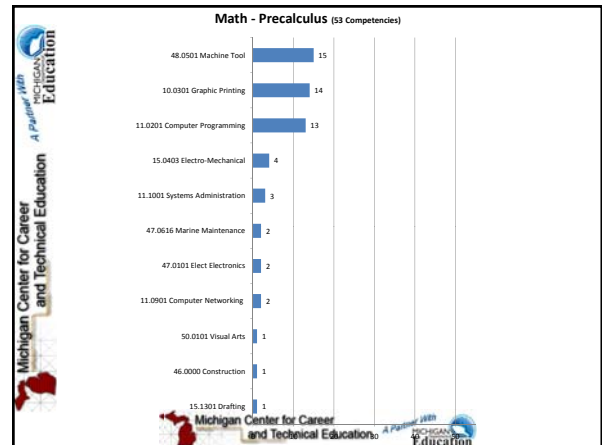
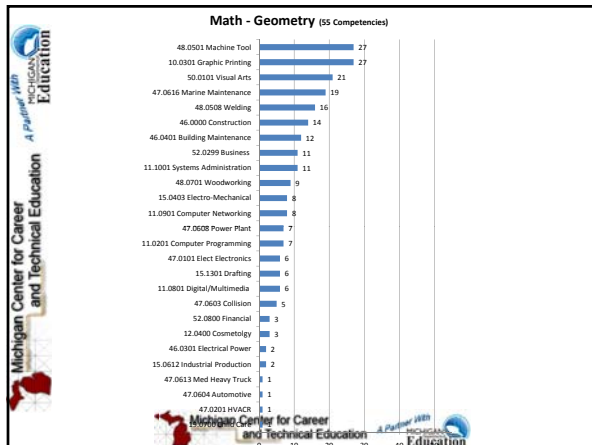
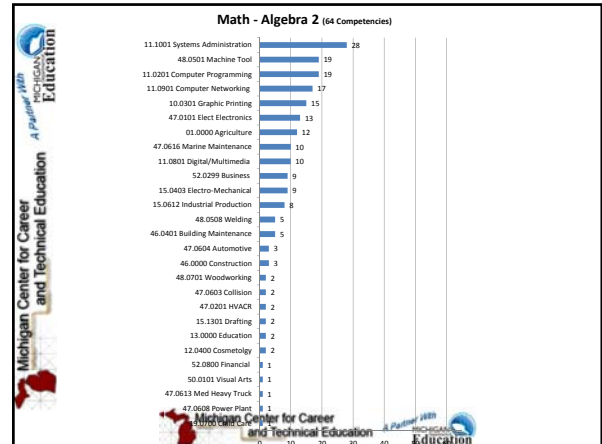
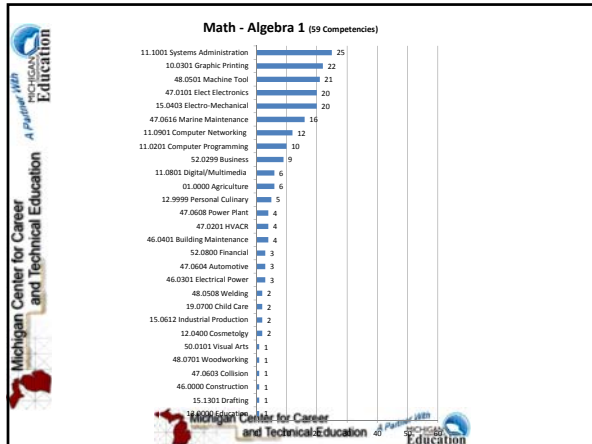
Non-OCED Countries

Hong Kong-China	542
Chinese Taipei	532
Estonia	531
Liechtenstein	522
Slovenia	519
Macao-China	511
Croatia	493
Latvia	490
Lithuania	488
Russian Federation	479
Israel	454
Chile	438
Republic of Serbia	436
Bulgaria	434
Uruguay	428
Jordan	422
Thailand	421
Romania	418
Republic of Montenegro	412
Indonesia	393
Argentina	391
Brazil	390
Colombia	388
Tunisia	386
Azerbaijan	382
Qatar	349
Kyrgyz Republic	322

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CTE concentrators take more and higher level math courses than general education counterparts,

- according to a 2002 NCCTE study.

Other reports show the CTE students do better on national tests.


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During high school CTE students are significantly more likely than their non-CTE counterparts to report that they developed


- problem-solving,
- project completion,
- research,
- math,
- college application,
- work-related,
- communication,
- time management and
- critical thinking skills during high school.

(Leikes et al., "Career and Technical Education Pathway Programs, Academic Performance, and the Transition to College and Careers," National Research Center for Career and Technical Education, Michigan Center for Career and Technical Education, A Partner With Michigan Education, 2/8/2010 79)

STEM



Technology




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The U.S. Department of Labor estimates that today's learner will have 10 to 14 jobs

• By age 38

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According to former Secretary of Education, Richard Riley

- The top 10 jobs that will be in demand in 2010 didn't exist in 2004

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Translation



We are currently preparing students for jobs that don't exist

Using technologies that haven't yet been invented

In order to solve problems we don't even know are problems yet.

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- 1 in every 8 couples married in the U.S. last year met online

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There are over 106 million registered users of MySpace (as of September, 2006)

If MySpace were a country, it would be the 11th largest in the world (between Japan and Mexico)

The average MySpace page is visited 30 minutes a day

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Retool Strategy #2



REALLY Embrace Career Clusters

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Manufacturing Cluster

Planning, managing, and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing process engineering.

<p>15.0403 – Electro-Mechanical Technology</p> <p>15.0612 – Industrial Production Technology</p> <p>48.0501 – Machine Tool Operation</p> <p>48.0508 – Welding, Brazing, and Soldering</p>	<p>47.0635 – Marine Maintenance</p> <p>48.0701 – Woodworking General</p>	<p>Manufacturing</p> <p>Maintenance</p> <p>Quality</p> <p>Logistics & Inventory</p> <p>Health & Safety</p>	<p>Cluster Knowledge & Skills</p>
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• Analytical Problem Solving • Communication • Critical Thinking and Creative Thinking • Information Technology Applications • Systems • Safety Health and Environmental • Leadership and Learning • Ethics and Legal Responsibilities • Entrepreneurial and Career Development • Technical Skills

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Manufacturing Cluster

Cluster Knowledge and Skills

- Production Pathway
 - Electro-Mechanical Technology
 - Industrial Production Technology
 - Machine Tool Operation
 - Welding, Brazing and Soldering
- Manufacturing Production Process Pathway
- Maintenance, Installation and Repair Pathway
 - Marine Maintenance
 - Woodworking General
- Quality Assurance Pathway
- Logistics & Inventory Control Pathway
- Health, Safety and Environmental Awareness Pathway

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Business, Management & Administration



Cluster Knowledge & Skills

- Administrative Services
 - Microsoft Office Specialist (MOS)
- Business Information Management
- Corporate/General Management
- Human Resources Management
- Operations Management

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BMA Cluster Foundation Knowledge and Skill Topics



- Cluster Topic: **Communications**
- Cluster Topic: **Ethics and Legal Responsibilities**
- Cluster Topic: **Employability and Career Development**
- Cluster Topic: **Leadership and Teamwork**
- Cluster Topic: **Problem Solving and Critical Thinking**
- Cluster Topic: **Information Technology Applications**
- Cluster Topic: **Safety, Health, and Environmental**
- Cluster Topic: **Academic Foundations**
- Cluster Topic: **Systems**

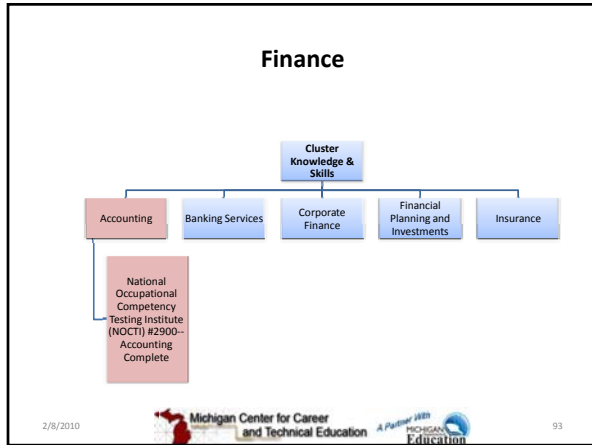
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BMA Pathway Skills

I		Pathway Topic: Business Law
	A	Knowledge and Skill Statement: Understands business's responsibility to know, abide by, and enforce laws and regulations that affect business operations and transactions
II		Pathway Topic: Financial Analysis
	A	Knowledge and Skill Statement: Understands tools, strategies, and systems used to maintain, monitor, control, and plan the use of financial resources
III		Pathway Topic: Information Management
	A	Knowledge and Skill Statement: Understands tools, strategies, and systems needed to access, process, maintain, evaluate, and disseminate information to assist business decision-making
IV		Pathway Topic: Operations
	A	Knowledge and Skill Statement: Understands the processes and systems implemented to monitor, plan, and control the day-to-day activities required for continued business functioning
V		Pathway Topic: Professional Development
	A	Knowledge and Skill Statement: Understands concepts, tools, and strategies used to explore, obtain, and develop in a business information management career
VI		Pathway Topic: Strategic Management
	A	Knowledge and Skill Statement: Understands tools, techniques, and systems that affect a business's ability to plan, control, and organize an organization/department






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Finance Cluster Foundation Knowledge and Skills



- Cluster Topic: **Communications**
- Cluster Topic: **Ethics and Legal Responsibilities**
- Cluster Topic: **Employability and Career Development**
- Cluster Topic: **Leadership and Teamwork**
- Cluster Topic: **Problem Solving and Critical Thinking**
- Cluster Topic: **Information Technology Applications**
- Cluster Topic: **Safety, Health, and Environmental**
- Cluster Topic: **Academic Foundations**
- Cluster Topic: **Systems**
- Cluster Topic: **Technical Skills**

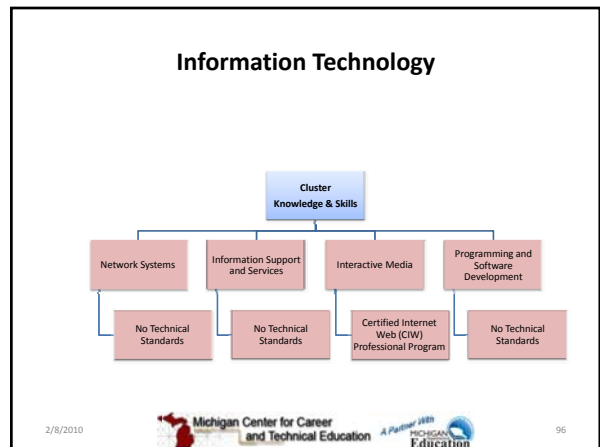
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Finance Pathway Knowledge and Skills

I		Pathway Topic: Business Law
	A	Knowledge and Skill Statement: Understands business's responsibility to know, abide by, and enforce laws and regulations that affect business operations and transactions
II		Pathway Topic: Financial Analysis
	A	Knowledge and Skill Statement: Understands tools, strategies, and systems used to maintain, monitor, control, and plan the use of financial resources
III		Pathway Topic: Information Management
	A	Knowledge and Skill Statement: Understands tools, strategies, and systems needed to access, process, maintain, evaluate, and disseminate information to assist business decision-making
IV		Pathway Topic: Professional Development
	A	Knowledge and Skill Statement: Understands concepts, tools, and strategies used to explore, obtain, and develop in an accounting career





2/8/2010 95



We MUST ask ourselves and our employers

Are there other jobs that we need to train for in this cluster?



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STOP PAUSE--DISCUSSION

- Retool Strategies
 - Use CTE to improve academic test scores
 - REALLY embrace career clusters


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Retool Strategy #3

Connect CTE education to economic growth industries.

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Perkins IV Mandates




High Wage

High Skill

High Demand









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Where are the High Wage, High Skill, High Demand Jobs?

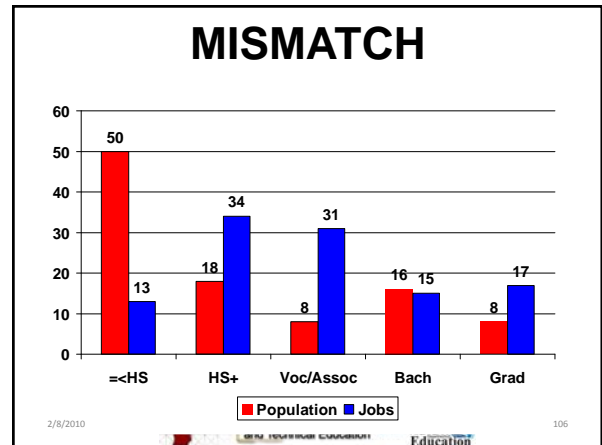
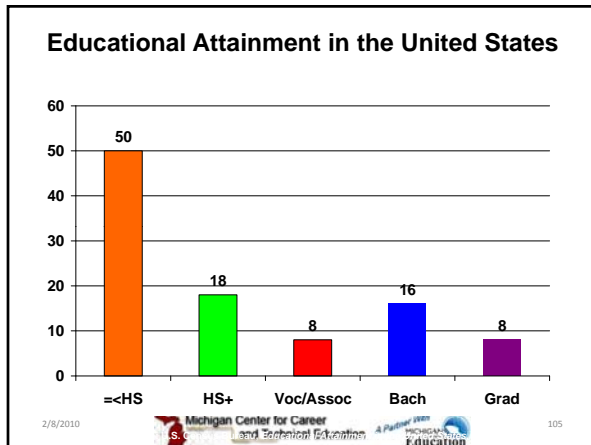
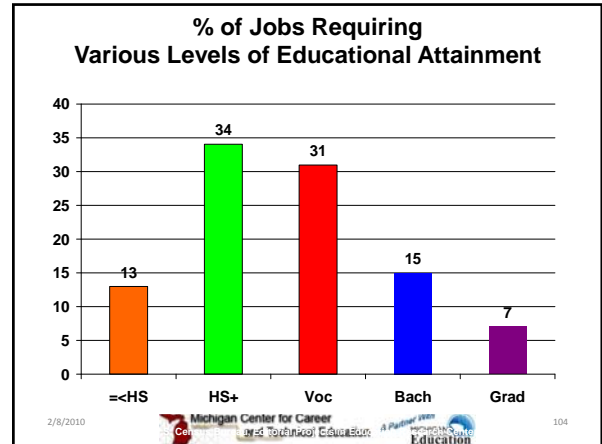
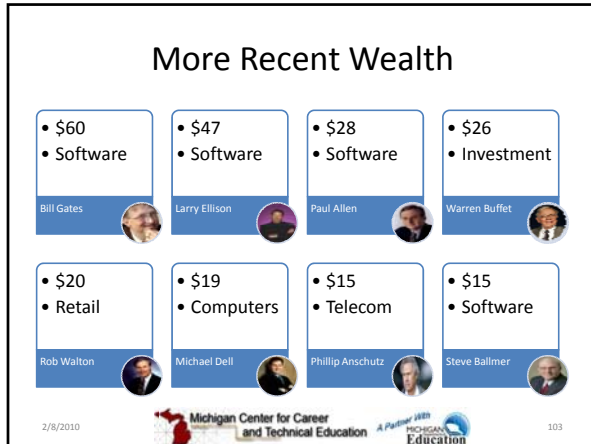


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1986 Wealth

<ul style="list-style-type: none"> \$4.5 billion Retail <p>Sam Walton</p> 	<ul style="list-style-type: none"> \$4.0 billion Candy <p>Mars Family</p> 	<ul style="list-style-type: none"> \$2.5 billion Media <p>John Kluge</p> 	<ul style="list-style-type: none"> \$2.5 billion Information <p>Ross Perot</p> 
<ul style="list-style-type: none"> \$2.3 billion Finance <p>Pritzker Family</p> 	<ul style="list-style-type: none"> \$2.0 billion Computers <p>David Parker</p> 	<ul style="list-style-type: none"> \$1.4 billion Investment <p>Warren Buffet</p> 	<ul style="list-style-type: none"> \$1.4 billion Retail <p>Leslie Wexner</p> 

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Source: Bureau of Labor Statistics, 2005

Jobs and Education: What is Required

Most Significant Source of Education and Training	Total Job Openings Due to Growth and Net Replacement 2002-2012	
	N	%
First professional degree	2616	1.6
Doctoral degree	2514	1.5
Master's degree	2043	1.3
Bachelor's plus experience	8471	5.2
Bachelor's degree	20515	12.6
Associate degree	6568	4
Postsecondary vocational award	7208	4.4
Work experience in a related	12364	7.6
Long-term on-the-job training	11586	7.1
Moderate-term on-the-job training	32410	19.9
Short-term on-the-job training	59027	36.3

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Michigan's 25 Fastest-Growing Occupations Through 2014

Occupation	% Job Growth	Occupation	% Job Growth
1 Network Systems & Data Communication Analysis	43.8	14 Social & Human Service Assistants	18.6
2 Medical Assistants	34.1	15 Amusement & Recreation Attendants	18.6
3 Computer Software Engineers, Applications	33.6	16 Computer & Information Systems Managers	18.4
4 Network & Computer Systems Administrators	30.2	17 Personal and Home Care Aides	16.9
5 Home Health Aides	27.8	18 Counter and Retail Clerks	16.7
6 Dental Hygienists	24.9	19 Hosts/Hostesses: Restaurant/Lounge/Coffee	16.7
7 Dental Assistants	24.7	20 Heating/AC/Refrig Mechanics/Installer	16.6
8 Special Ed Teachers, Pre/Kinder/Elem School	22.7	21 Pharmacy Technicians	16
9 Graduate Teaching Assistants	21.2	22 Preschool Teachers excluding special education	15.9
10 Computer Systems Analysts	21.1	23 Self-Enrichment Education Teachers	15.9
11 Registered Nurses	21.1	24 Sales Managers	15.6
12 Physical Therapists	21.0	25 Computer Support Specialists	15.5
13 Customer Service Representatives	19.3		

Source: Michigan Career Outlook Through 2014 Bureau of Labor Market Information & Strategic Initiatives, www.michigan.gov/mi, Oct. 2008

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Michigan's 25 Occupations with Largest Number of Annual Job Opening Through 2014

Occupation	Annual Openings	Occupation	Annual Openings
1 Retail Salespersons	7,512	14 Food Preparation Workers	1,398
2 Cashiers	5,369	15 Receptionists, Information Clerks	1,371
3 Waiters, Waitresses	5,310	16 Child Care workers	1,368
4 Combined Food Prep/Service Workers/ inc. Fast Food	4,577	17 Maintenance/Repair Workers General	1,347
5 Registered Nurses	3,498	18 Elementary School Teachers exc. Special Ed.	1,341
6 Laborers Freight/Stock/Material Movers, Hand	2,506	19 Nursing Aides, Orderlies, Attendants	1,330
7 Janitor/Cleaner Excl Maid/Housekeeping Cleaners	2,317	20 General Operations Managers	1,324
8 Office Clerks, General	2,211	21 Teacher Assistants	1,302
9 Customer Service Representatives	2,115	22 Bookkeeping/Accounting/Auditing Clerks	1,248
10 Stock Clerks, order fillers	2,014	23 Landscaping, Groundskeeping Workers	1,195
11 Sales Reps, Whlsl/Mfg, excl. Tech/Sci Product	1,774	24 Secretaries, excl. Legal/Medical/Executive	1,139
12 Team Assemblers	1,542	25 Accountants, Auditors	1,079
13 Truck Drivers, Heavy & Tractor-Trailer	1,532		

Source: Michigan Career Center, Bureau of Labor Market Information & Strategic Initiatives, www.michigan.gov/lmi, Oct 2008

Michigan's High Growth Occupations Requiring at Least Moderate On-The-Job Training Through 2014

Occupation	Job Growth to 2014	Hourly Wage	Occupation	Job Growth to 2014	Hourly Wage
1 Customer Service Representatives	11,950	15.53	14 Social/Human Service Asst.	1,350	13.90
2 Truck Drivers, Heavy & Tractor Trailer	7,140	18.43	15 Electricians	1,310	26.76
3 Sales Rep	5,690	29.12	16 Bookkeeping/Accounting/Audit Clerks	1,180	15.50
4 Medical Assistants	4,900	12.89	17 Plumbers, Pipefitters, Steamfitters	1,140	25.20
5 Maintenance/Repair Workers	4,650	18.08	18 Musicians, Singers	990	22.59
6 Carpenters	3,970	20.12	19 Painters, Construction, Maintenance	970	19.16
7 Cooks, Restaurant	3,540	9.87	20 Claims Adjusters/Examiners/Investigators	910	27.41
8 Dental Assistants	2,470	15.51	21 Brickmasons/Blockmasons	890	23.53
9 Executive Secretaries, Admin. Asst.	2,300	19.12	22 Operating Engineer/Other Construction	860	21.72
10 Police, Sheriff's Patrol Officers	1,560	23.36	23 Firefighters	810	19.16
11 Sales Rep, Whlsl/Mfg, Tech	1,500	35.66	24 Construction Laborers	800	16.11
12 Pharmacy Technicians	1,430	12.75	25 Payroll/Timekeeping Clerks	570	15.84
13 Heating/AC/Refrig Mechanics	1,390	19.90			

Source: Michigan Career Center, Bureau of Labor Market Information & Strategic Initiatives, www.michigan.gov/lmi, Oct 2008

Michigan's High Growth Occupations Requiring at Least an Associate Degree, Technical Training or Work Experience Through 2014

Occupation	Job Growth to 2014	Hourly Wage	Occupation	Job Growth to 2014	Hourly Wage
1 Registered Nurses	17,550	28.70	14 Fitness Trainers, Aerobics Instructors	1,050	12.39
2 Nursing Aides, Orderlies, Attendants	6,740	11.69	15 First Line Supv/Mgr, Mech/Install/Repairer	940	28.99
3 First Line Supv.Mgrs, Food Prep	2,940	14.39	16 Food Service Managers	930	21.25
4 Hairdressers/Hairstylists/Cosmetologists	2,880	10.92	17 Medical Records/Health Info Technicians	880	15.30
5 Automotive Service Technicians/mechanics	2,870	19.63	18 Radiologic Technologists/Technicians	860	22.04
6 Computer Support Specialists	2,190	20.90	19 First Line Supv/Mgr, Housekeep/Janitorial	840	17.40
7 First Line Supv. Mgrs, Retail Sales	1,830	19.43	20 Cost Estimators	830	30.18
8 First Line Supv Mgrs, Construction	1,820	30.97	21 First Line Supv.Mgrs, Non-retail Sales	810	37.07
9 Dental Hygienists	1,780	27.99	22 First Line Supv/Mgrs, Personal Services	790	17.71
10 Preschool, Teachers, Excl Special Ed	1,430	15.23	23 Purchasing Agents, Excl. Whlsl/Retail/Farm	770	28.55
11 First Line Supv/Mgr, Office/Admin Support	1,270	23.33	24 Legal Secretaries	750	18.34
12 Licenses Practical/Licensed Voc. Self	1,220	18.63	25 First Line Supv/Mgr Transportation	710	25.81
13 Self-Enrichment Education Teacher	1,160	17.61			

Source: Michigan Career Center, Bureau of Labor Market Information & Strategic Initiatives, www.michigan.gov/lmi, Oct 2008

Michigan's High Growth Occupations Requiring at Least a Bachelor's Degree Through 2014

Occupation	Job Growth to 2014	Hourly Wage	Occupation	Job Growth to 2014	Hourly Wage
1 General, Operations Managers	4,960	\$45.33	14 Management Analysts	1,940	42.33
2 Accounts, Auditors	4,160	28.68	15 Sales Manager	1,890	44.19
3 Physicians, Surgeons	3,610	69.14	16 Special Ed Teachers	1,620	N.A.
4 Computer Systems Analysts	3,450	35.79	17 Graduate Teaching Assistants	1,500	N.A.
5 Computer Software Engineers, Applications	3,360	36.59	18 Computer/Information Systems Managers	1,440	47.22
6 Secondary School Teachers (excl Special/Voc. Ed)	2,630	N.A.	19 Computer software Engineers, Systems Software	1,330	35.88
7 Elementary School Teachers (Excl Special Ed.)	2,610	N.A.	20 Financial Managers	1,290	45.01
8 Mechanical Engineers	2,580	35.48	21 Pharmacists	1,180	45.41
9 Network Systems, Data Comm Analyst	2,350	32.77	22 Human Resources, Training, Labor	1,130	27.38
10 Industrial Engineers	2,320	35.57	23 Medical/Health Services Managers	1,20	38.81
11 Lawyers	2,290	52.37	24 Public Relations Specialists	1,110	25.49
12 Network Computer Systems Administrators	2,090	28.12	25 Child, Family, School Social Workers	1,040	22.99
13 Chief Executives	2,010	66.37			

Source: Michigan Career Center, Bureau of Labor Market Information & Strategic Initiatives, www.michigan.gov/lmi, Oct 2008

Computer Jobs

The Detroit News (8/18, Rogers) reported that the

"shortage of computer workers" in Michigan "is particularly acute."

While the state's "overall...workforce shrinks, the number of information technology (IT) jobs is increasing."

Especially in demand are highly educated IT professionals such as

- software developers,
- systems analysts, and
- computer programmers."

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What Employers are Also Saying

"Increasingly, the computer will do the computation...but

- Thinking about the problem,
- Developing the problem,
- Understanding the problem,
- Looking at it from all sides,
- Decided what important information is relevant to the problem

is the harder part.

"manufacturing and distributing executive"



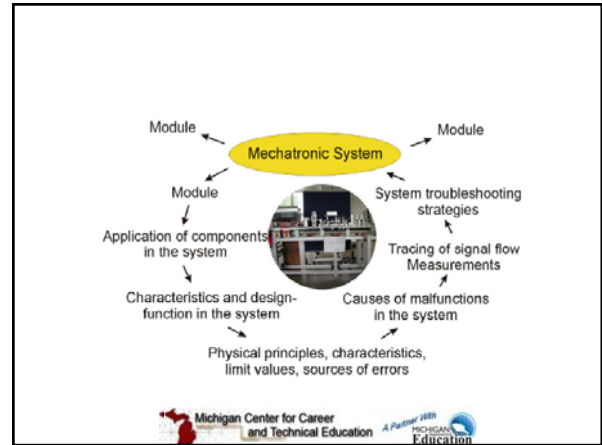
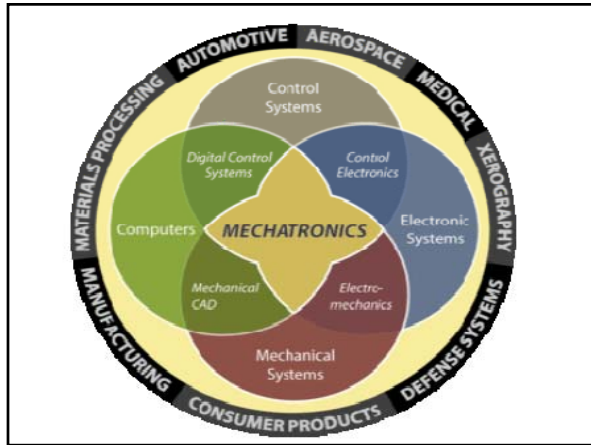
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http://www.milms.org/admin/uploads/Publications/1151_HOT_50_Jobs_Flyer_OCT-06.pdf

22 of the Hot 50

Michigan's Hot 50 through 2012	Average Hourly Wage	Projected Annual Job Openings	% Job Growth 2002-2012
Network Systems and Data Communications Analysts	\$27.42	185	45.6
Computer Software Engineers, Systems Software	\$34.53	270	45.3
Computer Software Engineers, Applications	\$34.40	446	36.5
Computer Systems Analysts	\$31.57	740	31.5
Network and Computer Systems Administrators	\$26.46	265	30.2
Personal Financial Advisors	\$57.56	131	29.5
Computer and Information Systems Managers	\$44.35	341	28.5
Sales Managers	\$48.32	391	28.3
Public Relations Specialists	\$25.61	263	25.2
Management Analysts	\$33.83	420	24.9
Marketing Managers	\$46.41	141	19.6
Bill and Account Collectors	\$15.17	372	19.0
Sales Representatives, Wholesale/Manufacturing Technical and Scientific Products	\$33.86	605	18.4
Sales Representatives, Wholesale/Manufacturing excl. Technical & Scientific Products	\$26.59	2,251	18.2
Claims Adjusters, Examiners, and Investigators	\$22.15	122	16.8
Property, Real Estate, and Community Association Managers	\$23.68	125	15.3
Reservations and Transportation Ticket Agents and Travel Clerks	\$15.03	154	14.6
Human Resources Assistants excl. Payroll/Timekeeping	\$15.46	149	13.5
Financial Managers	\$44.85	350	13.2
General and Operations Managers	\$45.25	1,248	12.3
Advertising Sales Agents	\$25.76	151	11.7
Purchasing Agents excl. Wholesale, Retail and Farm Products	\$27.94	378	11.0

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Promising Research Results

Career and Technology education students are

- 10-15% more likely to be in the labor force and
- earn 10% more than non-CTE graduates,


• 2001 Russell Sage Foundation study.

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But are our programs aligned to the job opportunities?

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May more Important, are our programs teaching what employers want?

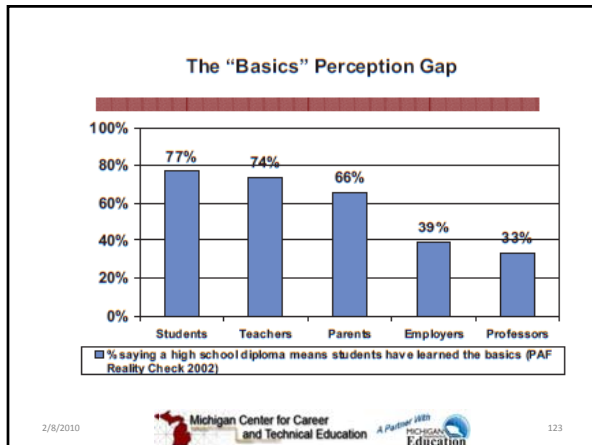


2/8/2010 Michigan Center for Career and Technical Education A Partner With MICHIGAN Education 121

Retool Strategy 4


Listen to employers!
Stop ignoring their data!

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Employers Want Better Academic Skills

National Association of Manufacturer's 2005 Survey:



84% said students were not prepared for the workplace



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Employers Say

Criteria such as

- language and cultural skills
- working in teams
- group learning
- Strong verbal and written communication skills

Are extremely important.

Center for Automotive Research, Beyond the Big Leave, The Future of U.S. Automotive Human Resources p. 57

2/8/2010 Michigan Center for Career and Technical Education A Partner With MICHIGAN Education 125

Employers Say

“Even those students seeking a technical or vocational degree will need skills formerly expected only for a 4-year college degree program.”

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MESSAGE

EMPLOYERS

Want to hire responsible students with high academic skills and sound habits of the mind.

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AVAILABILITY OF LOW-SKILL WORKERS

90% of the workforce will be in countries where the average wage is below \$1.00 per hour.

Population Reference at Columbia University, New York, NY

Average Manufacturing Wage

USA	\$ 17.20 / hr
Mexico	\$ 2.10 / hr
China	\$ 0.64 / hr
India	\$ 0.25 / hr

Sung Won Sohn, Executive Vice President and Chief Economist, Wells Fargo, 2

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IF YOU WERE THE C.E.O., where would you send your low-skills jobs?

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AVAILABILITY OF HIGH-SKILL WORKERS

CURRICULUM CONTENT

UNITED STATES WHAT IS NEEDED FOR COLLEGE	OTHER COUNTRIES WHAT IS NEEDED FOR THE WORKFORCE
<ul style="list-style-type: none"> * English * Algebra / Geometry * Biology / Chemistry * Social Studies * Foreign Language 	<ul style="list-style-type: none"> * Technical Reading * Computers * Statistics, Probability, Logic, Measurement, & Systems * Physics

Source: Willard B. Daggett, Ed.D., International Center for Leadership in Education

2/8/2010 Michigan Center for Career and Technical Education A Partner With Michigan Education 130

AVAILABILITY OF HIGH-SKILL WORKERS

UNITED STATES	OTHER COUNTRIES
MEMORIZE FACTS FOR WORKSHEETS AND QUIZZES	RESEARCH & ANALYZE APPLY KNOWLEDGE BETWEEN DISCIPLINES APPLY NEW KNOWLEDGE TO REAL-WORLD PROBLEM SOLVING

Source: Willard B. Daggett, Ed.D., International Center for Leadership in Education

2/8/2010 Michigan Center for Career and Technical Education A Partner With Michigan Education 131

IF YOU WERE THE C.E.O., where would you send your high-skills jobs?

2/8/2010 Michigan Center for Career and Technical Education A Partner With Michigan Education 132