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Michigan's K-12 STEM Ed Report Card 2011

Jobs & Economic Prosperity Through STEM* Education

*Defining STEM Education:

- **Science**: Biology, Chemistry, Marine Biology, Physics, Science
- **Technology**: Computer / Information Systems, Game Design, Developer, Web/Software Developer
- **Engineering**: Chemical, Civil, Computer, Electrical / Electronic, General & Mechanical Engineering
- **Mathematics & Statistics**

A Call to Action for Michigan!

K-12 STEM Education Helps Keep Our Economy Competitive: Over the past 50 years, taxpayer investment technology and STEM (Science, Technology, Engineering and Mathematics) education has indirectly produced more than half of the nation's economic growth. Prominent economists agree that no other investment generates a greater long-term return to the economy than scientific R&D — and that starts with our educational systems.[1]

274,000 = the number of STEM-related jobs Michigan will need to fill by 2018.[2]

Michigan kids and parents need to know about the potential for rewarding — and high paying careers in STEM. STEM professions and occupations are among the highest paying jobs. They are also the basis for a successful, globally competitive and innovative Michigan and U.S. economy. During the next decade, overall U.S. demand for scientists and engineers is expected to increase at four times the rate for all other occupations.[3]

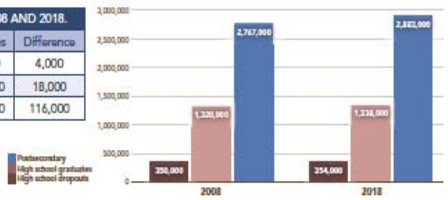
$74,958 = Average annual compensation of STEM occupations 2005-2008

STEM-related jobs are a gateway to many career choices. In the fierce **global competition for high value jobs**, *STEM education gives many younger workers a chance to earn more during their careers — and it provides more seasoned workers the skill sets that can be improved and adapted to employer needs as the economy changes dramatically over the next decade.*

Where Will Michigan's Jobs Be in 2018?

CHANGE IN JOBS BY EDUCATION LEVEL: 2008 AND 2018.

Education level	2008 Jobs	2018 Jobs	Difference
High school dropouts	350,000	354,000	4,000
High school graduates	1,320,000	1,338,000	18,000
Postsecondary	2,767,000	2,883,000	116,000



WHERE THE JOBS WILL BE IN 2018, BY OCCUPATION AND EDUCATION LEVEL (in thousands of jobs)*

OCCUPATIONS		High school dropouts	High school graduates	Some college	Associate's degree	Bachelor's degree	Graduate degree	Total
STEM	Computer and mathematical science	0	6	18	13	49	22	109
	Architects and technicians	0	1	3	3	4	2	12
	Engineers and technicians	1	6	15	13	51	30	116
	Life and physical scientists	0	1	3	2	7	9	21
	Social scientists	0	0	1	0	5	9	16

274,000 STEM Jobs

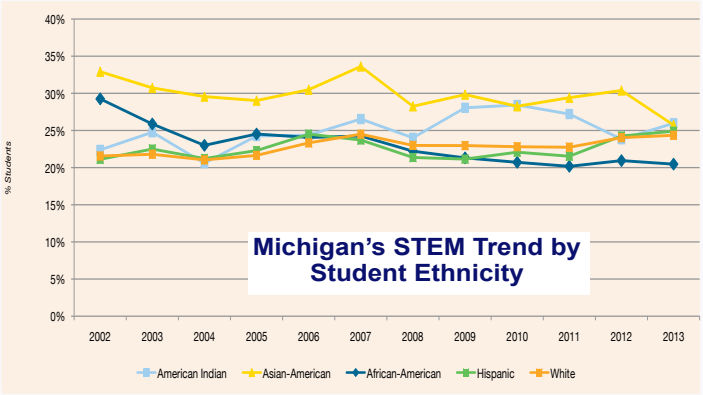
What's in This 2011 State STEM Ed Report Card?

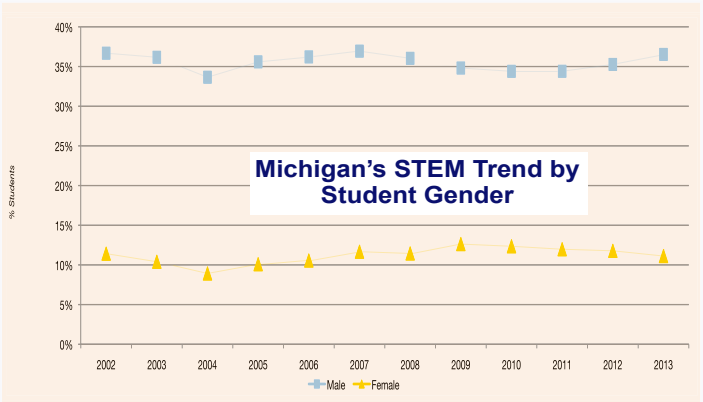
Diversity, Gender, Jobs & Our Future:

Timely Help for STEM-Interested Students Needed Now

The window for kids' receptivity to STEM topics sometimes closes early. A solution to the Michigan's STEM pipeline problem is to take action given known gender and ethnicity differences in STEM education. Early identification and mentoring by parents, families, civic groups and teachers can encourage early STEM success by students.

Wasted Potential? Michigan's STEM College Major & Career Interest Trend by Graduation Year **





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91% of U.S. STEM Jobs Will Require Some College or Better by 2018

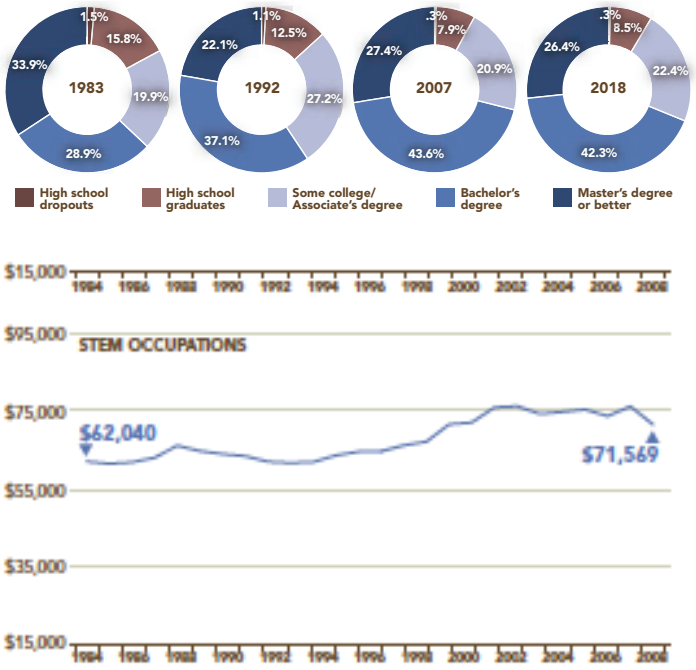
OCCUPATIONS:	Total occupational employment: Some college or better 2008		Total occupational employment: Some college or better 2018		Rate of growth in postsecondary attainment (upskilling)
	Percentage	Rank	Percentage	Rank	
Healthcare Professional and Technical	93%	1	95%	1	22%
Education	93%	2	93%	2	15%
STEM	90%	3	91%	4	19%
Community Services and Arts	89%	4	91%	3	17%
Managerial and Professional Office	83%	5	87%	5	15%
Sales and Office Support	62%	6	65%	6	14%
Healthcare Support	53%	7	59%	7	38%
Food and Personal Services	41%	8	44%	8	23%
Blue Collar	34%	9	35%	9	7%
TOTAL	60%		63%		16%

Not All STEM-Related Jobs Require Higher Education Degrees — but it Helps: Many STEM-related jobs in Michigan may not require higher education degrees, although about 68% of STEM occupations are projected to require a bachelor's degree or higher by 2018.

Thousands of Michigan jobs related to STEM talents will be related to technical skills, including services. And, once involved in STEM-related occupations, many Michigan workers will be able to "upskill" their talents thanks to employer-sponsored, community college based and/or other innovative training programs across a wide spectrum of skills and disciplines.

Educational Attainment in STEM Occupations (1983–2018).

Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018



Source of Charts: **Anthony** Carnevale, Nicole Smith & Jeff Strohl, Georgetown University Center on Education and the Workforce publication ***Help Wanted: Projections of Jobs and Education Requirements Through 2018.*** **June 2010.** **See www.cewgeorgetown@georgetown.edu**

STEM Occupations are Among the Highest Paying Careers in the U.S. & the World

How Will Michigan's Future Workforce Compete in a Global Marketplace? Advances in science and engineering are essential for ensuring America's — and **Michigan's** — economic growth, job creation, quality of life, and our national security.

• The U.S. Department of Labor predicts that jobs requiring science, engineering, and technical training will increase 34% between 2008 and 2018.[4]

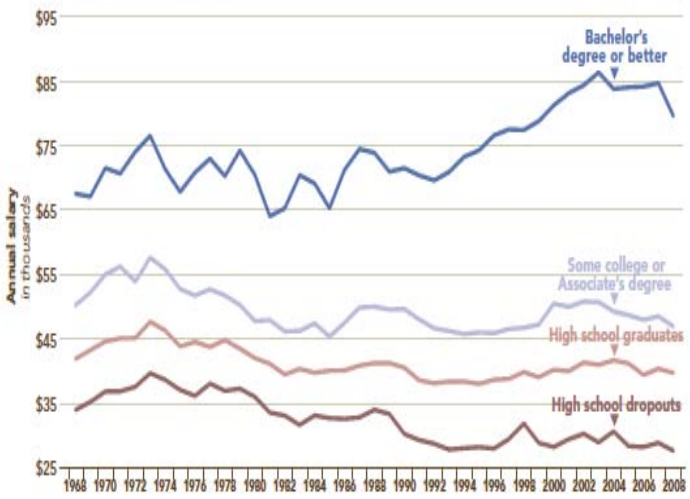
• The Science & Engineering (S&E) Workforce has grown at an average annual growth rate of about 6.2% since 1950, nearly 4 times the annual overall labor force growth rate of 1.6%. It totaled about 5.7 million workers in 2007.[5]

About 174,000 S&E Doctoral Degrees were awarded worldwide in 2006, of which about 30,000 — or 17% —were in the U.S. More than half of the S&E doctorates awarded in the U.S. went to non-U.S. citizens in 2006. For comparison purposes, China has probably surpassed the U.S. in doctoral degree production since 2006 according to the National Science Foundation and the European Union produced more than 52,000 S&E Doctoral Degrees in 2006.[6]

More Education = Higher Lifetime Earnings

On average, people with higher educational attainment have higher earnings.

Source: Authors' analysis of March CPS data, various years



Don't Forget Engineering! Introducing engineering concepts into K-12 education has the potential to improve student learning and achievement in science and math, increase awareness about what engineers do and to boost students' technological literacy, according to a recent report from the National Academy of Engineering and the National Research Council. See http://www.usinnovation.org/files/ReportonImprovingK-12EngineeringEducation909.pdf

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Rank**	General Demographic Indicators (latest available)	Michigan	Total U.S.
	Significant Educational, Demographic or Economic Indicators (latest)		
8	Population as of July 1, 2010	9,931,235	309,050,816
18	Average Wage by State per capita, 2008 ($)	$44,245	$45,563
37	Personal income per capita, 2010 ($)	$35,597	$40,584
5	Number of Public Elementary and Secondary Schools 2009	4,078	98,706
44	Pupil / Teacher Ratio 2009-2010	17.79	NA
	Latest Educational Scores for Science & Math		
	NAEP Scores (National Assessment of Educational Progress)[7]		
36	2009 Grade 8 Mathematics Average Score	278	282
23	2009 Grade 8 Science Average Score	153	149
	ACT Scores 2010 [8]		
45	Michigan's 2010 Average ACT Science Score	19.9	20.9
43	Michigan's 2010 Average ACT Math Score	19.7	21.0
1	Percentage of Graduates Taking ACT in 2010	100%	47%
	SAT® Scores & Percentage Participation 2010 [9]		
5	Michigan's Average Mean Score for SAT Mathematics 2010	605	516
41	Michigan's Percentage of Graduates Taking SAT Mathematics 2010	5%	47%
44	Michigan's Percentage of H.S. Students Taking Advanced Placement (AP) Math 2010	31%	42%
13	Michigan H.S. Students Taking Advanced Placement (AP) Exams (all disciplines) 2010	252,135	1,802,144
	STEM Workforce: STEM Degrees Produced 2007 [10]		
19	Bachelor Degrees in Nat. Sci. & Engineering Conferred per 1,000 Indiv. 18-24 yrs. Old 2007	9.5	8.1
21	Science & Engineering Grad. Students per 1,000 individuals 25-34 yrs. Old 2007	12.4	12.3
	Teacher Quality Indicators (K-12) 2004 [11]		
8	Number of H.S. Teachers Main Assignment in Math or Science 2006	3,592	91,993
6	Number of Middle School Teachers Main Assignment in Math or Science 2006	2,640	64,923
NA	% of H.S. Middle School Teachers with Math Certification	NA	NA
NA	% of Middle School Teachers with Science Certification	NA	NA
	NCES Key Educational Statistics — Public Schools (latest) [12]		
9	Total Expenditures (all Sources) on Public Elemen. & Second. Education 2009 ($ Billions)	$16.64	$517.7
9	Enrollment in Public Elementary & Secondary Schools 2009-2010	1,617,869	966,519 av.
29	Low-Income Students, 2008 (%)	35%	40.9%
31	Limited English Proficient, 2008 (%)	3.8%	8.5%
18	Number of H.S. Students who Graduated as Reported by State 2009 (%)	87.9%	86.5%
11	Number of Full Time Equivalent (FTE) Teachers, 2009-2010	92,691	3,209,627
6	Number of School Districts	854	17,916
37	High School Graduation Rate, All Students — "On Time," 2008	75.5%	72%

** rankings include the District of Columbia

Sources: 1. - 3. Georgetown University Center on Education and the Workforce publication Help Wanted: Projections of Jobs and Education Requirements Through 2018. June 2010; **4. - 6. Science & Engineering Indicators 2010, National Science Foundation (NSF); 7. U.S. Department of Education, National Center for Education Statistics, Institute of Education Sciences, National Assessment of Educational Progress (NAEP) 2009 (Mathematics) and 2009 (Science). 8. ACT, Inc.; 9. The College Board; 10. ACT, Inc.; 11. Council of Chief State School Officers (CCSSO) and State Departments of Education, Data on Public schools, 2007-2008; and 12. U.S. Department of Education, National Center for Education Statistics (NCES).** ** STEM TRENDS** Research provided by the **My College Options College Planning Program**, which collects the educational profiles of an estimated 2.5 million students annually across the nation. For more information, please visit: www.mycollegeoptions.org/content/siteresources/partnershipoverview. aspx

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Michigan's Jobs Future, Diversity & STEM Education

Michigan's Economic Future is Linked to STEM Education — and the Jobs & Quality of Life that higher paying jobs provide

- Between 2008 and 2018, new jobs in Michigan requiring postsecondary education and training will grow by 116,000 while jobs for high school graduates and dropouts will grow by 22,000.
- Between 2008 and 2018, Michigan will create 1.3 million job vacancies both from new jobs and from job openings due to retirement.
- 836,000 of these job vacancies will be for those with postsecondary credentials, 388,000 for high school graduates and 103,000 for high school dropouts.
- Michigan ranks 34th in terms of the proportion of its 2018 jobs that will require a Bachelor's degree, and is 35th in jobs for high school dropouts.
- 62% of all jobs in Michigan (2.9 million jobs) will require some postsecondary training beyond high school in 2018.

Job vacancies arise from two sources: There are brand new positions created as an occupation grows, and there are pre-existing jobs that people leave behind when they retire, or move into other occupations.

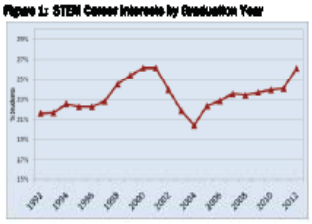
MICHIGAN'S RANK IN JOBS FORECASTED FOR 2018, BY EDUCATION LEVEL		
Education level	2018 Jobs	Rank
High school dropouts	354,000	35
High school graduates	1,338,000	25
Some college, no degree	1,129,000	8
Associate's degree	452,000	20
Bachelor's degree	650,000	34
Graduate degree	452,000	21

Source of Charts: **Anthony** Carnevale, Nicole Smith & Jeff Strohl, Georgetown University Center on Education and the Workforce publication ***Help Wanted: Projections of Jobs and Education Requirements Through 2018.*** **June 2010.** See www.cewgeorgetown@georgetown.edu

SOME GOOD NEWS: National Trends in Student STEM "Interest" is Rising

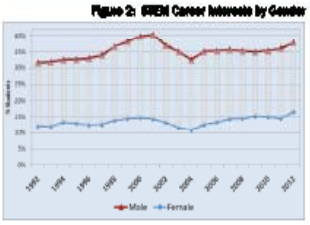
In its January 19, 2009 recommendations to the incoming administration, the National Science Board emphasized the development of, "Coalitions among parents, government, business and industry, private and corporate foundations, public figures, scientists and engineers, the media, and other stakeholders should be used to draw attention to the need and collectively develop locally relevant strategies to foster high quality STEM education for all students."

Figure 1: STEM Career Interests by Graduation Year



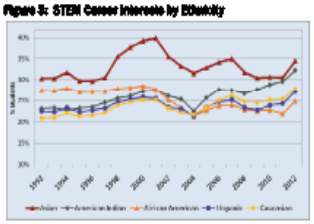
- Interest in STEM fields took a dramatic downturn after the Fall of 2001
- In 2005, after a more than 20% decline, interest began to rebound and has just now approached previous levels

Figure 2: STEM Career Interests by Gender



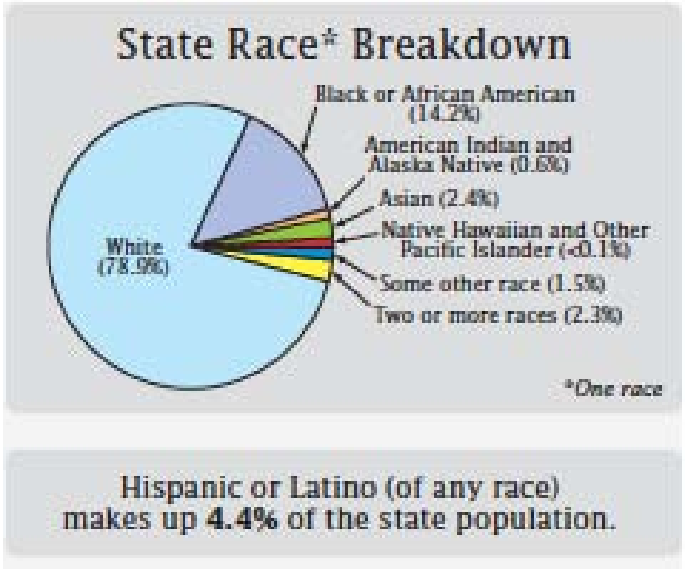
- Trend lines for interest in STEM fields are similar for male and female students
- The disparity in interest between male and female students peaked in 2001 and has steadily decreased to a still significant, yet lowest point in 15 years

Figure 3: STEM Career Interests by Ethnicity



- Asian students continue to display a high level of interest in STEM fields
- Prior to 2001, African-American interest in STEM fields was higher than any other ethnicity, excluding Asian students
- Interest in STEM fields by African-American students has plunged and is now lower than any other ethnicity

Michigan's Diversity & the Future of STEM Ed



Source: U.S. Census Bureau. 2010 Census.