



Educating a Tech-Savvy Workforce for Wisconsin

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INTRODUCTION

The Wisconsin Technology Council is the science and technology advisor to the Governor and the Legislature. Formally organized in 2001, the Tech Council is an independent, non-profit and non-partisan organization with members from tech companies, private equity firms, public and private education, research institutions, government and law.

The Tech Council has three core functions:

- To provide policy guidance to lawmakers, the Governor, state agencies and other institutions in Wisconsin;
- To create vibrant networking and educational opportunities for entrepreneurs, investors and others with a stake in Wisconsin's knowledge-based economy, and;
- To serve as an economic catalyst for the state through targeted programs, events and other strategies.

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EXECUTIVE SUMMARY

The economic security of the United States is threatened by our failure to harness the brainpower necessary to remain competitive in today's world. Unless this trend is reversed, our nation may lose the innovative edge it has enjoyed over the past century.

The threat of an ill-prepared workforce is real. It is as tangible for Wisconsin as it is any state. Wisconsin's potential for economic growth will be diminished unless the state produces more graduates in science, technology, engineering and math; retains those graduates; and supports related initiatives for job creation and business growth.

Wisconsin needs to invest in STEM education. STEM is a commonly used acronym used to abbreviate the keys that will unlock growth in the 21st century: science, technology, engineering and math. Solutions to complex issues are rarely simple, but invigorated STEM education will replenish and enhance Wisconsin's "human capital." Here are recommendations to improve Wisconsin's standing:

- Use student assessments effectively
- Provide teachers with the training they need
- Engage business in meaningful ways
- Celebrate successes in public ways
- Make STEM education a statewide public policy priority

A full description of these recommendations can be found on Page 9.

BACKGROUND

GLOBAL COMPETITIVENESS IN THE GLOBAL MARKET PLACE – CAN AMERICA KEEP ITS Foothold?

Research and development is a defining force in our national and state economies. Significant economic progress is tied to innovation that flows from investments in public and private research.

The Council of Economic Advisors reported in the late 1990s that 50 percent of the growth the U.S. economy has experienced over the last 40 years is attributable to investments in research and development.

While the United States remains the strongest and most innovative economy in the world, changes in the global marketplace are causing it to lose its edge.

This change is, in part, due to emerging foreign economies. While the United States anticipates increased federal investments in R&D in coming years, such investments were relatively stagnant from 2000 through 2007. Meanwhile, other nations have continued to invest. In fact, from 1990 to 2003, research and development expenditures outside the United States more than doubled, from \$225 billion to over \$500 billion. We are competing against nations that are hungry for progress.

Wisconsin ranks 13th among the states in terms of R&D spending by its academic institutions, with \$1.1 billion in the federal fiscal year ending Sept. 30, 2007, according to a January 2009 report by the Tech Council, “The Economic Value of Academic R&D in Wisconsin.” That report also noted that academic R&D leads, directly and indirectly, to 38,000 jobs in Wisconsin.

In short, Wisconsin has a significant “market share” in academic R&D, which is conducted by scientists, technologists, engineers and mathematicians. If the state does not have enough qualified researchers, it will lose that market share.

GLOBAL COMPETITIVENESS AND NATIONAL SECURITY – SAFETY IN NUMBERS AND INNOVATION

In the larger sense, the United States will benefit from the rise of market economies. Democratic capitalism is an antidote to totalitarianism, turmoil and war. At the same time, R&D investments by countries outside of the United States also have implications for our economic security and our national security. National security and economic security are directly linked; we cannot maintain one without the other. STEM education, skilled workers, research discoveries and entrepreneurial innovation all play vital roles in maintaining and strengthening the financial and military security our nation has experienced.

“The principal ways to secure our nation’s economic prosperity and military capability are to strengthen our educational system and revamp and re-energize the structures for innovation...” – Meeting America’s Economic and Security Challenges in the 21st Century, 2006

CHANGES IN 21ST CENTURY JOBS AND SKILLS

“Employers are increasingly interested in hiring people who not only can execute well but also can create the next wave of innovation.” Tapping into America’s Potential, 2005

It is common today for people to say that knowledge is power. The idea is central to almost every circumstance in the modern world, including education, commerce, politics, the military and interpersonal relationships. Exactly how knowledge and its uses affect economic development, however, is a more complex subject that can be understood in terms of education and personal income. The conventional wisdom is that higher levels of knowledge lead to higher levels of personal income.

The reason for the higher average earnings of educated workers is that during the 20th century, the agricultural economy gave way to an industrial economy, then to a service economy, and finally to a knowledge economy. In this evolutionary process, the educational attainment of a worker became a key differentiator in the market for human resources. The higher the educational attainment of the worker, the more knowledge the person could apply to the job, thereby increasing the worker’s overall effectiveness. Higher education, therefore, is an essential ingredient for a knowledge-based economy because knowledge is the key input to increasing economic productivity (getting more goods and services from existing inputs) and fostering technological innovation (creating new products and services).

To be sure, the agricultural, industrial and technology economies of the 20th century used knowledge (how to farm, how to manufacture) to create income and wealth. What is different about the knowledge economy of the 21st century is that the collective knowledge of humanity is now embedded in everyday goods and services. The impact of this embedded knowledge on the value of modern products and services is enormous and increasing daily. The ability to “add value” through new technologies and discoveries, the ability to know more about customer wants and needs, and the ability to deliver products and services more precisely and quickly depend on the management of data and information to create new knowledge and a competitive advantage.

Wisconsin needs a knowledge strategy to be competitive in the modern knowledge-based, global economy. Building a knowledge-rich, high-technology sector in our economy will require that Wisconsin have a clear plan for the systematic production of new knowledge-based products and services. New scientific discoveries and technologies developed in Wisconsin can provide the competitive advantage for Wisconsin businesses, if and only if such knowledge can be identified and rapidly deployed. That demands a more tech-savvy workforce – one that is up to the challenge of transferring knowledge and innovation to the marketplace.

At precisely the time we need more knowledge-based workers, the United States has experienced a slow but serious decline in the number of STEM graduates. While the United States was third per capita in engineering graduates in 1975, it ranks 17th in the world today.

While some may question the quality of the degrees produced, countries such as China and India are producing more STEM grads than the United States by any measure. The problem is aggravated in the United States because the nation loses so many of the graduates it educates. In a National Science Foundation Survey conducted in 2006, 20 percent of doctorate degree earners in science and engineering fields who had temporary visas planned to leave the United States after graduation. By comparison, 96 percent of doctorate degree earners in science and engineering fields who either were

U.S. citizens or had permanent visas planned to remain in the country. Examining engineering alone, 62 percent of doctoral degrees in this field went to foreign nationals in 2006.

To fill the higher education pipeline, we need more middle school and high school students who are interested in pursuing STEM careers. According to the Program for International Student Assessment, America's 15-year-olds performed below the international average in mathematics literacy and problem solving, ranking our youth 27th out of 39 countries. Considering this and similar reports, it is no surprise that while postsecondary enrollment has increased in the United States in the past decade, the proportion of students obtaining STEM degrees has declined. The proliferation of these issues sets the stage for an inadequate workforce for 21st century global competition. If the STEM pipeline is not replenished, we are in danger of losing our edge in innovation.

STEM IN WISCONSIN

WISCONSIN'S ECONOMIC HEALTH

The Wisconsin Department of Workforce Development's projections for the state parallel that of the nation's growth in STEM occupations. The DWD estimates that one in 10 Wisconsin jobs is a STEM jobs. STEM jobs are also the fastest growing occupations in the state. Between 2006 and 2016, STEM jobs will account for one out of five new jobs in the state. That's more than 5,250 jobs each year.

PER CAPITA INCOME AS A MEASURE OF ECONOMIC HEALTH

In order to know where we're going as a state we need to know where we are.

Per capita income is a common measure of a state's relative economic health. By this standing Wisconsin has work to do. Not only is Wisconsin (\$36,200) behind the national average (\$38,600) according to 2007 U.S. Census Bureau figures, but it falls behind the other I-Q Corridor* states Illinois (\$40,900) and Minnesota (\$41,000). These are neighbors with the same climate, with similar natural resources and who are also pegged as states in the "fly-over zone" with regard to the investment. Just meeting the national average in 2007, would have generated \$13 billion in personal income and \$432 million in additional in state tax revenue in Wisconsin.

The per capita leader in this regional grouping is Minnesota. Minnesota is also a leader in STEM programs and resources; not only in the I-Q Corridor* but nationwide. *Learn more about Minnesota and STEM in the "Leading States" section.*

*The I-Q Corridor is defined as a 400-mile region stretching between the Twin cities of Minnesota and Chicago, Illinois rich in ideas, innovative workers, investment capital, quality of life, quality of research and quality of labor force. For more on the I-Q Corridor go to www.i-qcorridor.com.

TALENT RETENTION AS A MEASURE OF ECONOMIC HEALTH

As the state encourages creation of "knowledge economy" jobs, it must produce people who can work those jobs. A second indicator of a state's economic health is the strength of its human capital. Wisconsin faces a very real brain drain issue when it comes to retaining trained workers knowledgeable in the most cutting edge software, technology and scientific methodologies.

Simply put, **brain drain** is a phrase describing the loss of skilled or knowledge-based workers (usually college educated) from in a particular geographical area. Conversely, **brain gain** describes the net emigration of skilled workers into a particular geographical area.

Surveys indicate that many Wisconsin graduates who live in Wisconsin are satisfied by what the state has to offer and have not looked out-of-state job opportunities. A 2006 survey conducted by Competitive Wisconsin and the Wisconsin Alumni Association reported that 60 percent of UW-Madison alumni who reside in the Wisconsin and are from Wisconsin have stayed here, having never left post graduation.

Brain drain can be looked at two ways: the loss of recent graduates and the loss of skilled workers, who may not necessarily be recent grads. The focus is on the exodus of recent graduates, those individuals of particular importance who are ready to exercise their fresh knowledge and new skills in the latest industries, those individuals who by net figures leave Wisconsin.

While Wisconsin ranks high for bachelor's degrees produced, 15th in the nation, it ranks in the bottom 10 states in attracting and retaining people with bachelor's degrees. Postsecondary Education Opportunity reports the number of people in Wisconsin 25 and over with at least bachelor's degrees in Wisconsin increased between 1989 and 2007 by 377,275. However, during this time, Wisconsin colleges and universities awarded 505,767 degrees, which translates in an overall net loss of 128,492 people with degrees.

The answer to why they leave as stated in the OPPORTUNITY report parallels the findings in other separate reports on the brain drain issue: job opportunities and social experiences/attachments.

“Regional economic growth is driven by the location choices of creative people, the holders of creative capital who prefer places that are diverse, tolerant and open to new ideas.” –The Rise of the Creative Class: and How It’s Transforming Work, undated

“Wisconsin must become a more open and creative community one less resistant to change.” – Vision 2020: A Model Wisconsin Economy, 2003

REGIONAL WORK FORCE DEVELOPMENT NEEDS

“The road to a healthy Main Street runs through the knowledge-based economy.”

In the first quarter of 2009, the Wisconsin Technology Council and Wisconsin Security Research Consortium toured the state to discuss the how STEM education is essential to U.S. and Wisconsin competitiveness. These meetings also led to an overview of local programs helping Wisconsin develop a skilled workforce. The program titled, “Educating a Tech-Savvy Workforce,” drew more than 575 business owners, community leaders, educators, legislatures and others to a half-dozen town hall style meetings throughout the state.

The program left a core message for each audience: The need to replenish Wisconsin’s workforce is real and it cannot be done without dedicated business involvement.

In turn, the audiences had their own message for educators and state and local policymakers:

General responses the program gathered from around the state were the following:

- College-level educators are concerned with the quantity of remediation teaching needed for new college students. A surprising amount of remediation teaching goes to students who scored well in high school math and science.
- Businesses professionals in technical disciplines are frustrated with the need to retrain workers in basic math. They feel as though this ability should be developed before graduation.
- Business professionals sense that their local school districts would rather be left alone than hear their input. They feel they are often asked for financial assistance – but rarely asked for their advice about what should be taught in the schools.
- Business leaders and educators alike believe the current student assessment system, with overlapping state and federal requirements, produces a culture of “teaching to the test.” They believe that hampers classroom innovation and cuts into the time needed to work together on producing better graduates.

“The need exists for schools to become more engaged with industry. Industry has been reluctant to offer hands-on work experience opportunities for youth under the age of 18.” – Kris Pawlawski, Eau Claire

“My area needs more higher-paying jobs so graduates will stay in the community. We need adjustments in education curriculum to be far-sighted in future needs. We need to maintain dialogue with employers and educators.” – Corinna Neeb, Stevens Point

STEM EDUCATION ATTAINMENT IN WISCONSIN: A COMPARATIVE LOOK

“America’s competitive edge in the global economy, the strength and versatility of its labor force, its capacity to nourish research and innovation – all are increasingly dependent on an educational system capable of producing a steady supply of young people well prepared in science and math.” – Keeping America Competitive, 2005

The same is true for Wisconsin.

While the nation ranks poorly from a global perspective, Wisconsin middle and high school students rank well in math and science achievement from a national perspective.

The percentage of Wisconsin students in 4th and 8th grade who are at least proficient in math and science is above the national average and second to Minnesota in a comparison of neighboring states, according to 2007 figures from the U.S. Department of Education.

Wisconsin students preparing for continued education scored above the national average in college entrance exam scores (ACT/SAT) and above all neighboring states except Minnesota.

And yet, there’s fundamental dissatisfaction among educators who believe the assessment system is a flawed indicator and among employers who say too many students are ill-prepared. In addition, segments of Wisconsin’s K-12 population are failing to gain the STEM skills they need to become competitive workers. Many students, particularly young women, lose interest in science and math by

the time they've completed middle school. Too many students are not exposed to careers that may not require a four-year college degree – but which require a strong working knowledge of science and math.

According to a report by the Education Trust, Wisconsin also continues to lag behind in closing the education achievement of all racial and ethnic groups. Additionally, while Wisconsin records math and science scores above the national average, the rate at which Wisconsin students improve their scores year to year is below average, especially among low-income students.

COLLEGES AND UNIVERSITIES – WHAT ACTION ARE THEY TAKING?

“The educational attainment of a worker has become a key differentiator in the market for human resources.” - Vision 2020: A Model Wisconsin Economy, 2003

The higher the educational attainment of the worker, the more knowledge the person can bring to the job, thereby increasing the worker's overall effectiveness. Higher education is the foundation for a knowledge-based economy because knowledge is the key input to increasing economic productivity and fostering technological innovation.

The Wisconsin Department of Workforce Development reports that 9 percent of the jobs in STEM occupations require a Ph.D or master's degree, 56 percent require a bachelor's degree, 14 percent require an associate's degree and 14 percent will require some postsecondary training.

In short, almost all STEM jobs require more than a high school degree. Wisconsin's post-secondary triad, the UW System, the Wisconsin Technical College System, and Wisconsin private colleges and universities, are drivers in assuring our workers have the skills necessary to be productive in emerging economies.

Each of the following systems is a partner in major statewide efforts to address STEM issues. These are their individual focuses.

The UW System

The *Growth Agenda for Wisconsin* is the UW System's vision to help Wisconsin citizens thrive in today's innovation economy. The vision aims to produce more skilled degree holders; create more well-paying jobs by supporting business development, entrepreneurship and research; and build stronger communities.

The UW System has increased the number of programs with industrial applications related to science, technology, engineering and math. It has also increased efforts to work within regional business communities and have increased research efforts. In the context of innovation, many UW System schools and their researchers have emerged as leaders in research fields.

Wisconsin Technical College System

The Wisconsin Technical College System plays an important role in postsecondary STEM education by providing an affordable way for students to enter the workforce with less than a four-year investment and programs highly influenced by businesses. Curriculum is designed with the immediate employability of graduates in mind and these graduates are produced in less than four years.

Technical colleges throughout Wisconsin offer credit and advanced standing agreements between high schools allowing students to begin technical college programs while in school and attracting them to technical colleges after graduation.

The Wisconsin Technical College System offers nearly 1,000 career and technical education programs in STEM fields. The WTCS continues to add programs in emerging industries. Over the last two years, the WTCS has approved 14 new postsecondary programs in STEM fields. In the 2007-2008 school year, the WTCS enrolled more than 63,700 students in STEM programs and courses.

Wisconsin Association of Independent Colleges and Universities

The Wisconsin Association of Independent Colleges and Universities (WAICU) includes 20 private or independent colleges that educate about 58,000 students.

WAICU members play an important role in serving minority and low-income students in postsecondary education. WAICU members enroll a higher percentage of minority students than the UW System does. About 13 percent of WAICU students are minorities; 20 percent of WAICU students are classified as low-income.

The Wisconsin Association of Independent Colleges and Universities also plays a role in transitioning skilled students into STEM fields. In the 2006-2007 school year, private colleges and universities accounted for 27 percent of all bachelor's degrees awarded in the state. Of the state's bachelor's degrees, WAICU members accounted for 30 percent of engineering graduates, 33 percent of computer science graduates, 41 percent of all healthcare graduates and 51 percent of nursing graduates.

MODES FOR CHANGE AND SUCCESSFUL MODELS

LEADING STATES AND THEIR POLICIES

Other states are aggressively addressing STEM education needs. (A link to a detailed review of other state policies and activities related to STEM can be found in Appendix A.)

Minnesota is a nearby example of STEM leadership. Minnesota champions a number of public-private driven STEM programs and initiatives, including BioSMART, getSTEM, Minnesota MentorNet, MN-STEM.com and SciMathMN. Minnesota K-12 students perform well in math and science compared to students in other states in the United States.

PROGRAMS CURRENTLY IN THE STATE

What's working within Wisconsin? There are several standout STEM programs in Wisconsin, including Project Lead the Way, FIRST Robotics Competition, FIRST Tech Challenge, Science Olympiad, the Badger State Science and Engineering Fair and many others.

A link to Wisconsin's STEM programs can be found in Appendix B.

- Project Lead the Way (PLTW) is a nationally recognized curriculum program that engages middle and high school students in pre-engineering and pre-biomedical science courses. PLTW is

growing in Wisconsin. Wisconsin currently ranks fourth in the nation for the number of students engaged in the program. In Wisconsin, the majority of these students are in the Milwaukee Public School District. In 2007, PLTW enrolled 15,240 students, which is more than double enrollment from 2006. In 2008, PLTW's student enrollment in Wisconsin grew by 32 percent to more than 20,210 middle school and high school students in 160 schools.

Initial start-up support for the implementation of these programs in Wisconsin schools came from a grant from the Kern Family Foundation in 2004. Since that time several entities have signed on to ensure the financial sustainability of the program including the Governor, the Legislature, the Department of Public Instruction and the Department of Workforce Development. The UW System, WI Technical College System, and multiple private colleges, such as Marquette and Milwaukee School of Engineering support the program's mission by offering scholarships and credit-transfer opportunities.

- FIRST Robotics Competition (FRC), FIRST Tech Challenge (FTC) and Vex Robotics Competition (VRC) are globally recognized robotics and engineering competitions that engage kids not only in the life of engineering and research but also business. These extracurricular programs serve schools and teams of high school students at different levels of financial resources.

FIRST and Vex are separate but similar programs. FRC is the varsity FIRST sport in which students make large-scale robots and have the potential to participate in a global competition. FTC is a mid-level robotics competition offering the traditional challenge of FRC but with a more affordable robotics kit. VRC is the most versatile, affordable and accessible platform for student robotic competitions grades six through 12. Beginning builders can design, assemble and quickly iterate their robots through trial and error. Advanced builders can utilize sophisticated programming capabilities and a wide range of accessories to power highly intelligent robots.

- Science Olympiad is national team-based program that engages K-12 students in a number of science, engineering and robotics competitive opportunities. The span of available topics is broader than most other STEM programs and the curriculum can be taught in and outside of the school.

The national competition, which is often utilized as a student recruitment opportunity, will be hosted by the Alliant Energy Center and UW-Madison in 2011.

RECOMMENDATIONS

We need your help to give Wisconsin a strong push in the right direction. Wisconsin needs to invest in STEM efforts. Science, technology, engineering and math are the keys to unlocking our growth in the 21st Century. Here's what we believe will help lead Wisconsin down the right path:

Use student assessments effectively

Wisconsin must have clear, rigorous, world-class academic content and achievement standards that reflect 21st century skills, including science, technology, engineering and math. As recommended by the State Superintendent's Next Generation Task Force, all students should be motivated by relevant, engaging assessments that are dynamic in analysis and that are linked to 21st century skills, including high school assessments that are linked to college and/or career readiness. Ways to accurately test student mastery of technology skills should be devised. These assessments should inform what happens in the classroom, monitor student progress at regular intervals and measure the performance of Wisconsin students against their peers worldwide.

Provide teachers with the training they need

Wisconsin teacher licensing requirements should include latitude for teachers whose backgrounds are in professions outside of education. Wisconsin should revive the idea of summer training academies, such as those once operated through the Wisconsin Academy of Arts and Sciences, which offer teachers the tools they need to become more effective. A financially sustainable model involving both public and private supporters will be necessary. Additional continuing education opportunities can be built into the school year, drawing upon the expertise of existing organizations such as Project Lead the Way, Badger State Science and Engineering Fair, and the FIRST Robotics Competition and Tech Challenge.

Engage business in meaningful ways

It's a myth that most business people don't care about what goes on in the schools. They recognize they will someday be hiring the products of those schools, and understand that a smart investment up front will pay dividends down the road. But most business people don't know how to connect with their local schools, or believe their assistance won't be accepted unless it's written on a check. Some don't know the most valuable thing they can do is to offer internships or other learning opportunities for students and teachers. In Minnesota, the "getSTEM" initiative helps to connect business and education in tangible, deliberate ways, include a web site that features "asks" and "offers."

Celebrate successes in a public way

An annual awards program for excellence in STEM education should become a part of a high-profile conference, such as the Wisconsin Entrepreneurs' Conference or Wisconsin Early Stage Symposium, which are gathering places for researchers, entrepreneurs and investors with a stake in a highly trained workforce. Such an event will serve to keep the importance and impact of STEM education visible in the eyes of those we need to support it.

Make STEM education a statewide public policy priority

The Governor and Legislature should establish a statewide task force that would focus on four major areas: (1) Tracking best practices in other states and nations and making recommendations based upon them, (2) Engaging businesses and business people in STEM education on a continuing basis, (3) Encouraging a PK-16 collaborative approach to STEM education, and (4) Developing recommendations for a long-term funding approach for effective STEM education that involves public-private partnerships.

CONCLUSION

Wisconsin has seen a surge of interest in STEM education, but that has largely come from private groups and individuals acting independently. Wisconsin government and schools should not do anything to dampen that spirit of innovation. However, the public sector can and should build upon the good work already being done by providing a more systematic, sustainable framework to STEM education. Today in Wisconsin, the chances of a student receiving an exciting and strong foundation in STEM rest on the presences of a few committed educators, the continued involvement of volunteers and foundations, and a bit of luck. Other states have improved STEM education as a way to increase innovation and creativity with a purpose. For its own economic well-being, Wisconsin should do the same.

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APPENDIX

APPENDIX A: RECENT STATE POLICIES/ACTIVITIES, ECONOMIC/WORKFORCE DEVELOPMENT--HIGH TECH (STEM)
(PROVIDED BY THE EDUCATION COMMISSION OF THE STATES, 2007)

VISIT: [HTTP://WWW.WISCONSINTECHCOUNCIL.COM](http://www.wisconsintechcouncil.com) – CAN BE FOUND UNDER “PUBLICATIONS – VISION 2020”

APPENDIX B: LIST OF STEM PROGRAMS IN WISCONSIN
(PROVIDED BY STEM7)

SEE BELOW

LIST OF STEM PROGRAMS IN WISCONSIN

Program	Organizer	Brief Description
Future City Competition – Wisconsin Regional	Engineers & Scientists of Milwaukee www.esmke.com	Teams consist of three students in 7th and/or 8th grade, a teacher, and a volunteer engineer mentor Teams are challenged to: <ul style="list-style-type: none"> • Design a city of the future using SimCity software • Build a scale model of a section of the city using recycled materials • Write an essay - “<i>Creating a Self Sufficient System Within the Home Which Conserves, Recycles and Reuses Existing Water Sources</i>” • Develop a 5-7 minute presentation about the features and qualities of their city Teams begin the program in September to prepare for the regional competition in January The 1st place team wins a trip to Washington DC in February during National Engineers Week to participate in the national finals
Construction Challenge	Ginger Green www.destinationimagination.org ; www.constructionchallenge.org	The Construction Challenge is a Career Education Initiative that helps develop the workforce of the future with teen participants competing and solving infrastructure, design, and service tech Challenges using teamwork, creativity and problem solving.
Rube Goldberg Machine Contest	The Milwaukee Area Engineering and Technology Partnership www.marquette.edu/engineering/pages/Rube/default.html	The contest challenges teams of high school students to build a machine to do a very simple task in a complicated way. Teams consist of up to 12 high school students and two teachers The top three teams receive trophies, medals and cash prizes The winning team is invited to compete at the National Rube Goldberg High School Machine Contest at Purdue University
FIRST Robotics Competition FIRST Tech Challenge Vex Robotics Competition	FIRST Wisconsin Regional Planning Committee www.wisconsinregional.org FIRST Tech Challenge and VEX Robotics, Marc Couture www.vexrobotics.com www.usfirst.org	FIRST Robotics Competition (FRC), FIRST Tech Challenge (FTC) and Vex Robotics Competition (VRC) are globally recognized robotics and engineering competitions that engage kids not only in the life of engineering and research but also business. These extracurricular programs serve schools and teams of high school students at different levels of financial resources. Read more in the <i>Educating a Tech-Savvy Workforce in Wisconsin</i> report.
Wisconsin Science Olympiad	http://wisconsinso.org/divc/	The Science Olympiad is an international nonprofit organization devoted to improving the quality of science education, increasing student interest in science and providing recognition for outstanding achievement in science education by both students and teachers. These goals are accomplished through classroom

Program	Organizer	Brief Description
		activities, research, training workshops and the encouragement of intramural, district, regional, state and national tournaments. The Science Olympiad tournaments are rigorous academic interscholastic competitions that consist of a series of individual and team events, which students prepare for during the year.
Project Lead the Way – Wisconsin	Milwaukee School of Engineering http://www.pltw-wi.org	Project Lead the Way (PLTW) is a nationally recognized curriculum program that engages middle and high school students in pre-engineering and pre-biomedical science courses. Read more in the <i>Educating a Tech-Savvy Workforce in Wisconsin</i> report.
Badger State Science and Engineering Fair	Wisconsin Science Education Foundation www.bssef.org	Simply put, a science fair is one of the most amazing educational and personal experiences our youth can have. They can explore real life challenges, expand interpersonal skills, develop public speaking skills, improve written talents, boost self-confidence, add to a resume, and win prizes and scholarships while interacting with other students, parents and leaders in our community.
Wisconsin Transpo Expo	Wisconsin DOT and Engineers & Scientists of Milwaukee www.dot.state.wi.us/news/events/expo.htm	Wisconsin Transpo Expo is a unique, multi-faceted event providing awareness of transportation and technical career opportunities. It is a one day event featuring <ul style="list-style-type: none"> • Kickoff session featuring a nationally recognized keynote speaker • Showcase for 1,000 middle school students to show their STEM-related projects and interests... side-by-side with high schools, colleges, and universities and transportation-related organizations and employers • Exciting game show-style competitions
sySTEM Now! Conference	Engineers & Scientists of Milwaukee www.esmke.com	sySTEM is an acronym for <u>S</u> trengthening our <u>Y</u> outh in <u>S</u> cience, <u>T</u> echnology, <u>E</u> ngineering and <u>M</u> athematics Now! means now! Since 2004, sySTEM Now! has become a cornerstone of STEM-related awareness in our region: <ul style="list-style-type: none"> • Raising awareness of STEM-related issues • Exchanging best practices from existing STEM programs • Developing, promoting and implementing partnerships between business and education • Providing networking opportunities for STEM stakeholders
STEM7 Initiative	Engineers & Scientists of Milwaukee www.esmke.com	The STEM7 initiative serves as the catalyst for increasing awareness of the STEM challenge, creating partnerships and collaborative efforts between educators and employers, bringing consistency, efficiency, and synergy to existing STEM programs, and continually assessing and improving the STEM environment STEM7 is backed by a broadly based consortium representing academia, private and public sector employers of STEM talent, state and local government, economic/ workforce development organizations, and the philanthropic community.
Wisconsin STEM Portal	Wisconsin STEM Portal Development Team	A unique collaboration of individuals from public agencies and private organizations has come together with the goal of developing an online clearinghouse of resources for all STEM-related

Program	Organizer	Brief Description
	www.wistem.org	<p>educational/employment/career activities in Wisconsin</p> <p>The portal is envisioned as a site that would serve as a centralized meeting spot for policy-makers, educators, students, businesses, career facilitators, and citizens to connect STEM needs with educational and career opportunities in their communities and throughout the state</p>
Bots IQ	<p>Tool, Die and Machining Association of Wisconsin</p> <p>www.tdmaw.org/battlebots.cfm</p>	<p>The BotsIQ program provides an innovative and alternative way to teach students and increase the number of students entering technical career fields. The need for a more experienced technical workforce is vital if the U.S. is to remain competitive in today's global economy.</p>
4-H SET Program	<p>University of Wisconsin-Extension</p> <p>http://www.uwex.edu/ces/4h/set/index.cfm</p>	<p>The 4-H Youth Development Program is directly connected to the research and resources of the 106 land grant universities and colleges of the Cooperative Extension System. This connection strategically positions 4-H to strengthen US global competitiveness and leadership.</p> <p>For more than a century, 4-H has engaged our country's youth in the building blocks of economic success. This has meant a solid focus on agricultural science, electricity, mechanics, entrepreneurship, and natural sciences. Today, 4-H out-of-school opportunities also exist in subjects like rocketry, robotics, bio-fuels, renewable energy, and computer science.</p> <p>4-H Science, Engineering and Technology programs reach more than 5 million youth with hands-on learning experiences to encourage young minds and to fill the pipeline of young leaders proficient in science. These experiences are supported by more than a half million dedicated adult volunteers who are placing 4-H youth on a path towards successful careers</p> <p>The 4-H Science, Engineering and Technology Program must be part of the long-term solution for improving science literacy and aptitude of America's youth. 4-H will address our nation's critical challenge by preparing 1 million new young people to excel in science, engineering, and technology by 2013. As a public-private partnership, 4-H can focus a variety of resources and expertise to strengthen young people's discovery and exploration of science. We believe fostering passion in science today will shape education and career decisions tomorrow.</p>
4-H Gateway Academy	University of Wisconsin-Extension	<p>The day camps inspire students going into grades seven, eight and nine to explore science, technology, engineering and math (STEM) and consider career opportunities in these important fields.</p> <p>At each 4-H Gateway Academy, certified instructors provide expert instruction in small-group settings. Campers work together using leading-edge technologies to sample disciplines such as robotics, aeronautics and computer design. Both individually and as teams, campers construct a remote-controlled robot and program it to navigate a maze in a race against the clock. Using computer 3-D modeling software, campers design, build and test a rocket for maximum possible altitude and perfect landing.</p>

Program	Organizer	Brief Description
ACE Program	Wisconsin DOT http://www.dot.wisconsin.gov/travel/air/ace.htm	Aviation Careers Education (ACE) is a summer employment opportunity for high school students and more. ACE promotes aviation and space education in all grade levels, offers extracurricular activities and provides students experiences in aviation related jobs. ACE is the result of partnerships between industry, schools and government.
Career Awareness Summer Project	Wisconsin DOT http://www.dot.wisconsin.gov/business/engrserv/newsletter/qtr2/casp.htm	<p>The Wisconsin Department of Transportation (WisDOT) and the Federal Highway Administration (FHWA) are sponsoring a one-week residential program for youth interested in transportation related careers. The Career Awareness Summer Project (CASP) offers a camp-like experience in a hands-on, safe and fun environment. It runs August 3-8 at Marquette University, 716 N. 11th Street, Milwaukee.</p> <p>CASP is open to anyone in grades 5 through 8 throughout Wisconsin. Since CASP began in 1999,, over 500 students have experienced transportation related careers.</p>