

A blue outline of the state of Wisconsin is positioned in the upper half of the image, behind the title text.

Wisconsin STEM

Navigators to the future



"Employers increasingly say they are searching for soft skills as much as technical knowledge, meaning they want workers who can pull together as a team, communicate internally and externally, adjust to changing conditions and function as lifelong learners."

Tom Still, President
Wisconsin Technology Council

Wisconsin Top 20 High-Growth Occupations 2004-2014

Percentage Increase in Number of Jobs

Job Title	2004	2014	Percent Increase
1. Physician Assistants	1,310	1,990	51.9%
2. Home Health Aides	13,730	20,790	51.4%
3. Network Systems and Data Communications Analysts	4,220	6,240	47.9%
4. Medical Assistants	5,890	8,640	46.7%
5. Computer Software Engineers, Application	7,960	11,610	45.9%
6. Computer Software Engineers, Systems Software	2,740	3,890	42%
7. Personal/Home Care Aides	21,260	29,460	38.6%
8. Dental Hygienists	4,390	6,050	37.8%
9. Dental Assistants	5,050	6,950	37.6%
10. Diagnostic Medical Sonographers	840	1,140	35.7%
11. Network and Computer Systems Administrators	5,300	7,190	35.7%
12. Surgical Technologists	2,120	2,860	34.9%
13. Database Administrators	1,550	2,090	34.8%
14. Medical Records and Health Information Technicians	3,540	4,770	34.7%
15. Respiratory Therapists	1,460	1,960	34.2%
16. Registered Nurses	48,410	64,420	33.1%
17. Physical Therapist Assts.	1,220	1,620	32.8%
18. Radiologic Techs	4,130	5,440	31.7%
19. Radiation Therapists	390	510	30.8%
20. Animal Breeders	490	640	30.6%

Foreword

STEM teaching and learning is an innovative approach to unlock creativity and problem solving in learners of all ages. Through discovery, modeling and contextual learning students realize their potential and excel in active learning environments. STEM partnerships throughout the state have demonstrated the potential to unlock growth in education and workforce training by integrating the knowledge and skills of science, technology, engineering and mathematics in ways that expand college and career choices for students.

Students graduating with this winning combination of interdisciplinary education and career driven "soft skills" demonstrated through project-based learning are exactly what employers are asking for.

This document, a navigational tool for STEM education and training, was created in response to the growing need from educators, businesses and governmental officials to clarify the expectations of all partners in establishing STEM career opportunities for all learners. The success markers outlined in this report are intended to serve as a collective state vision for STEM education. A call to action builds upon vision and challenges all Wisconsinites to engage in STEM as a strategy to strengthen our education and workforce talent pipelines in careers that will grow our states economy.

Originating with the Wisconsin State Leadership Team for Project Lead The Way, the task was laid out to Wisconsin's Technical Colleges, public and private colleges and universities, Wisconsin Department of Public Instruction, Wisconsin Department of Workforce Development and Wisconsin Manufacturers and Commerce to convene a grass-roots dialog for the purpose of creating a "navigation tool," to guide educators, business and policy leaders in establishing a STEM talent pipeline for Wisconsin.

Positioning Wisconsin in the Global Economy

As outlined by the Wisconsin Technology Council, in addition to being a current and technical term of art, the notion of a navigational strategy for STEM talent in Wisconsin is compelling for the following reasons:

- It underscores the necessity of competing globally, using the latest and best information about opportunities and economic trends.
- It implies that rapid, even unexpected, turns may be needed from time to time in order to keep moving forward.
- It will produce homegrown workers for the 21st century workforce.
- It brings high-technology, problem-solving teaching and learning into classrooms across our state.

For centuries navigators set out to discover new frontiers and establish paths for others to follow. Establishing the Wisconsin STEM Navigators to the Future report was critical to establishing a research agenda, policy implications and systemic education reform to advance STEM as a sustaining educational strategy for all learners.

"STEM is critical to our success at GE as well as the key to children becoming successful thinkers and problem solvers."

Gina Dundun, Magnetic Resonance,
GE Healthcare



Developing a Navigational Tool for Wisconsin

Driven by innovation, technology and human capital, Wisconsin's future is hinged upon a skilled and talented generation of learners. The Wisconsin STEM Navigators to the Future is intended to inspire commitment by educators, community leaders and employers of STEM talent from both the public and private sector, to engage in strategies that will put an emphasis on the importance and value of STEM related fields and the careers that drive innovation.

By working together, PreK-12 school systems, colleges and universities, educational cooperatives, businesses and industries, youth organizations, local and state government organizations and other supportive professional organizations can provide a fertile ground to grow a New Wisconsin Idea. That new idea leverages the collaborative participation of industry to redesign the educational experiences of students at all grade levels; creating a climate of learner engagement, technological literacy, and academic success for teachers and administrators to gauge their school's performance.

Stakeholders for the Wisconsin STEM Navigators to the Future report included citizens from all sectors of business, education, labor, government and community based organizations, who participated in the collection of facts, opinions and ideas, to create the strategic success markers contained within this report.

A voluntary advisory committee refined the process and collaborated with the University of Wisconsin-Milwaukee to analyze the results of six statewide data gathering summits. The following discoveries represent the result of the study and set the navigational success markers for leveraging STEM talent in Wisconsin.

Success Markers

Five major success markers have been identified by Wisconsin's STEM advocates:

1. Eliminate barriers that prevent learners from exploring STEM careers;
2. Increase emphasis on acquiring STEM knowledge and skills for all learners;
3. Increase public/private partnerships with a focus on STEM skills;
4. Establish a statewide awareness campaign for STEM careers;
5. Invest in pre- and post-professional development for educators to fully understand and integrate STEM throughout the curriculum.

Each success marker description includes opinions on current status, necessary actions needed, and measures of success.

Vision for the Future

Working together on a clearly defined set of educational and workforce development goals, Wisconsin's PreK-12 educators and employers of STEM talent will ensure that all Wisconsin learners have the opportunity to gain the knowledge and skills necessary to prepare for and succeed in STEM related careers.



"It is essential for students to have access to role models in STEM related careers. Participating in an engineering camp in the seventh grade is what inspired me to become an engineer."

**Alyssa Albrecht, Product Engineer,
A & E Tools**



Success Marker 1

Eliminate barriers that prevent learners from exploring STEM careers.

Success Marker 2

Emphasize acquiring STEM knowledge and skills for all learners.

Current Status

- A common awareness and understanding of STEM knowledge and skills is lacking.
- A statewide governance structure for STEM advocacy does not currently exist.
- STEM is viewed as an add-on to the existing curriculum.
- STEM stakeholders and advocates lack a common communication structure to network and share resources.

- Wisconsin high school students consistently demonstrate high levels of achievement in math and science, but for many, STEM careers are not an attractive option.
- Females and minority students enroll at disproportionately low rates in STEM courses.
- Graduation requirements do not consistently recognize STEM courses.
- Educational funding does not provide an incentive for STEM academic success.
- There is not a consistent method of recognition for STEM success by post-secondary institutions.
- The media does not always portray a positive image of STEM careers.
- Relatively few students engage in post-secondary STEM education or pursue STEM careers.

Required Actions

- Develop STEM education outcomes then integrate them into core content areas at all levels of secondary and post-secondary education.
- Charge a state sanctioned body with overseeing a comprehensive strategy for STEM.
- Provide statutory support for STEM education.
- Education leaders utilize STEM as an education reform agenda framed with increasing student engagement and academic achievement.

- Increase secondary and post-secondary articulation agreements for STEM courses.
- Identify STEM knowledge and skills within the state education standards.
- Fund incentives for schools and communities to adopt innovative STEM initiatives that demonstrate academic integrity and student achievement.
- Establish a state STEM Scholars program to recognize students transitioning into STEM-related post-secondary degree programs.
- Improve participation rates of female and minority students in STEM.

Success Measures

- Ensure that statutory language provides clarity for the definition and integration of STEM education.
- The state sanctioned STEM body provides an annual public progress report of outcomes.
- Charge the sanctioned body with developing and sustaining Wisconsin's STEM infrastructure.

- Improve student achievement in identified STEM content areas with state standards.
- Ensure that state funding for a STEM innovation grant is in place.
- Demonstrate consistent media advocacy and coverage throughout the state.
- Demonstrate progress on closing enrollment, retention, and achievement gaps for under-represented populations participating in STEM education.

Success Marker 3

Increase public/private partnerships with a focus on STEM skills.

- Islands of excellence exist between schools, colleges, universities and companies, with tremendous variation and little replication.
- STEM employers understand the need for a talent pipeline and are eager to partner with schools at all levels.
- Partnerships tend to be local in nature with few examples of statewide collaboration.
- The school culture has not provided teachers the support to fully establish sustaining partnerships with STEM employers.
- Partnerships work best with diverse and shared interests, both public and private.
- Many employers and educators do not understand how to engage in STEM partnerships.

- Business and professional associations support a statewide effort to promote public/private partnerships.
- Create incentives and opportunities for business to collaborate with schools.
- Create incentives for teachers to work with college and university instructors to develop academic content for partnership projects.
- Provide flexibility for student, work-based learning experiences in STEM careers.

- Every school district in Wisconsin can identify at least one STEM-related business partnership.
- Wisconsin has an incentive-based STEM internship scholarship opportunity for all qualified students.
- Wisconsin will experience increased talent in STEM careers.
- Imbed STEM enrichment programs into youth organization programs and competitive events.
- Expand supervised work-based learning opportunities in STEM careers.

Success Marker 4

Establish a statewide awareness campaign for STEM careers.

- Regional organizations have worked to establish a local brand for STEM.
- The Business Journal Serving Greater Milwaukee has produced a major STEM series since 2008.
- Schools throughout Wisconsin have developed STEM pathways and education programs that can serve as best practices for other school districts.
- Professional organizations in business and education have begun to align STEM with their professional objectives.
- A Wisconsin STEM navigational study has been developed.
- The media does not always portray a positive image of STEM careers.

- State leaders must advocate for STEM as a part of developing the talent pipeline.
- Build on the regional brands to leverage a collective state marketing brand for STEM education.
- Establish a funding stream for an impact marketing campaign.
- Establish a STEM ambassadors' network of business leaders.
- The state-sanctioned body develops a statewide media campaign to inform the general public about STEM careers.

- Ensure that an organized statewide media campaign is in place.
- Identify a minimum of 100 STEM ambassadors.
- Include STEM training opportunities in workforce development funding.
- Develop and maintain a WISTEM.org website widely populated with best practices.
- The Wisconsin STEM Navigators to the Future report is embraced with success measures implemented.

Success Marker 5

Invest in pre- and post-professional development for educators to fully understand and integrate STEM throughout the curriculum.

- Wisconsin has well established professional development opportunities for educators at all levels.
- State teacher education program standards provide opportunities to embed state academic and STEM standards into teacher pre-service.
- Science, technology, engineering and mathematics professional organizations actively engage teachers in in-service activities.
- There is a decline in the number of technology and engineering teachers and career programs.
- Professional development programs tend to be isolated by educational discipline.
- Reduced available funding for education limits the opportunity for teacher development.
- Professional development activities for STEM fields tend to occur in silos.



- University teacher education programs develop cross-training experiences for teachers in STEM disciplines and across disciplines.
- Expand support for flexible teacher licensing in STEM-related fields.
- Expand teacher externship and job shadowing opportunities with business and industry.
- Align professional development resources with targeted talent development needs for Wisconsin.
- Focus professional development on innovative design-based strategies to improve critical thinking experiences for students and teachers.

"STEM is an education philosophy designed around a cooperative effort to provide students with a comprehensive, meaningful real world learning experience."

**Dr. Alan Gomez, University of Wisconsin
College of Engineering**

- All Wisconsin university teacher education programs embrace STEM preparation for all graduates.
- Align all Wisconsin university teacher education programs with the needs of business and industry.
- Train all new teachers in STEM inquiry, problem solving and project-based learning approaches.
- Establish a clearinghouse of best practices in teaching, curriculum and assessment.



"The STEM effort in Wisconsin is helping us to meet the need for more Engineers, Planners and Technicians as well as expose youth to careers in transportation."

Dewayne J. Johnson, P.E.
Director, Southeast Region
Wisconsin Department of Transportation

A Call to Action

More than two dozen states have initiated STEM-related plans in recent years. They are led variously by governors, universities, technical colleges, state education departments, workforce development partners, industry associations and public/private partnerships. In all cases, groups are working together to advocate for increased efforts to improve our nations' talent pipeline.

Even with all the attention being paid to STEM, few states have been able to leverage STEM talent to influence state policy, secure funding, or change public perception on STEM-related careers. Wisconsin's policy leaders must embrace this comprehensive report and begin to invest in strategies that will impact education and training for youth and adults, create a STEM pathway for lifelong learning, engage employers and business associations and build public awareness for the value of a highly-educated talent pipeline for our economy.

Youth and adults deserve a brighter future for their careers; employers need to secure a workforce that is highly competitive; and our communities will become more closely engaged in the connections between the world of education and the world of work in our highly technical society.

Our call to action is for everyone concerned about the future of Wisconsin's economic prosperity, our education competitiveness, and our ability to sustain career opportunities for future generations to get involved by becoming a learner and champion for STEM in your local school and community.

More specifically, we call on

- **Wisconsin State governmental leaders to value STEM education as integral to academic success by establishing accountability and funding models to support STEM at all levels of education and training.**
- **Business leaders to step forward and commit the resources needed to improve local schools through STEM partnerships.**
- **Educators to continually improve the engagement of students through integrated and applied experiences in classroom and community-based learning opportunities.**



"STEM education is an imperative to secure our states viability in a competitive global economy."

S. Mark Tyler
President, OEM Fabricators

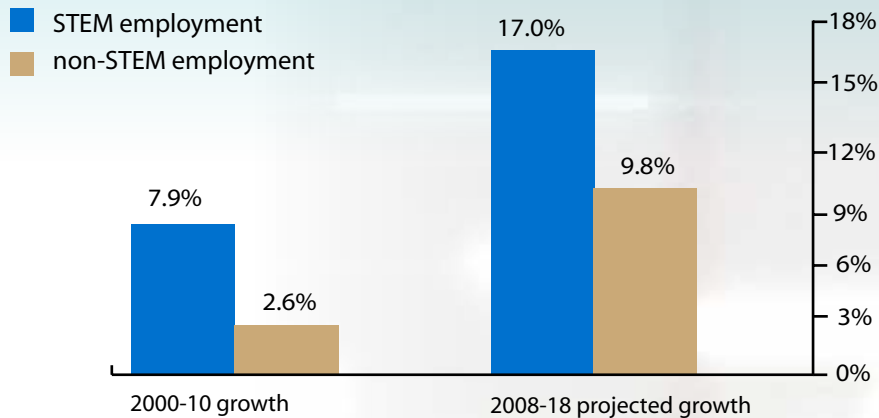
Occupational Outlook

"Elevating STEM education throughout all of our school systems is vital to the success and sustainability of U.S. companies in the international marketplace."

Alan Verploegh
Vice President,
Mitchell Metal Products

In a 2011 report issued by the U.S. Department of Commerce Economics and Statistics Administration, the Office of the Chief Economist states that STEM occupations are projected to grow by 17% from 2008 to 2018 and that STEM workers command higher wages, earning 26% more than their non-STEM counterparts. Over the past ten years, growth in STEM jobs was three times as fast as non-STEM jobs. STEM workers are less likely to experience joblessness and play a key role in sustained economic growth for a local economy. STEM workers drive our state and nation's innovation and competitiveness. The greatest advancements in our society from medicine to mechanics have come from the minds of those interested in or studied in the areas of STEM. They are essential for developing our technological innovation and global competitiveness.

Recent and Projected Growth in STEM and non-STEM Employment



Source: ESA calculations using Current Population Survey public-use microdata and estimates from the Employment Projections Program of the Bureau of Labor Statistics.

http://www.esa.doc.gov/sites/default/files/reports/documents/stemfinaljuly14_1.pdf

Contributors

There were over 700 contributors to this report who speak with a shared vision for STEM and the opportunity it provides for all Wisconsinites. The Wisconsin STEM Navigators to the Future report is intended to enlighten the public, inform policymakers, engage educators and build commitment from business leaders, to champion STEM as a talent-development strategy that will build a stronger Wisconsin.

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Additional supporting information on the Wisconsin Navigators to the Future report, along with valuable STEM resources for educators, employers and STEM advocates can be found at STEMForward.org