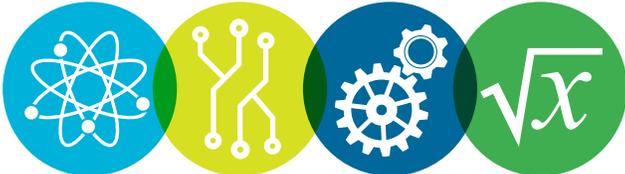


The Great Lakes Bay Regional Alliance presents the

STEM

The logo for the STEM Impact Initiative features four overlapping circles in a row. From left to right: a blue circle with a white atomic symbol, a yellow-green circle with a white circuit board pattern, a dark blue circle with a white gear, and a green circle with a white square root symbol. Below the circles, the words "Impact Initiative" are written in a black, sans-serif font.

Impact Initiative

A comprehensive strategy for developing Science, Technology, Engineering and Math excellence to build the workforce of tomorrow aligned with the needs of regional employers.

NOVEMBER 2014

WHY STEM?

**STEM is
Science
Technology
Engineering
Math**

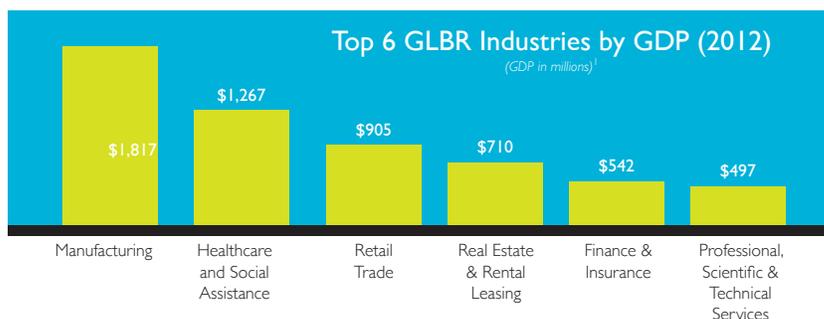
The nationwide attention being given to STEM education is rooted in some well understood realities. The world is changing. Gone are the days when a high school graduate, or even a dropout, could simply show up at the front gates of a manufacturing plant and start working. Gone are the days when companies could produce the same products in the same way year after year. Those days have been replaced by cutting-edge technologies and constant innovation. Companies with the ability to adapt will succeed in this world. People with the skills needed by those companies will succeed in this world. Increasingly, those skills are in science, technology, engineering and math (STEM) areas. STEM skills are required for a wide range of high-demand occupations, including engineers, scientists, computer technicians, health care workers, welders, chemical process operators, electricians and many more.

*One in two U.S.
high school
graduates is ready
for college-level math.*

*One in three
U.S. high school
graduates is ready
for college-level
science.*

STEM jobs grew at three times the rate of other jobs in the past decade and are projected to grow by another 17 percent by 2018, the U.S. Department of Commerce reports. The annual mean wage for a STEM job is \$79,395 — nearly 71 percent higher than the average for all occupations and industries, according to data from the Bureau of Labor Statistics. Unfortunately, not enough people are ready to step into those jobs. Students majoring in STEM areas make up only 16 percent of all college graduates, the National Center on Education Statistics reports.

The Great Lakes Bay Region is driven by a STEM-focused economy. The region has several large STEM employers, each with a heavy emphasis on manufacturing or healthcare. Roughly 38 percent of the region's economic output is driven by those two industries. A tradition of strength in science and manufacturing gives the Great Lakes Bay Region a head start in the race to STEM excellence. Discovery, innovation and the practical application of know-how are in the very soul of the region and its people. Few areas of the nation offer the fertile soil for STEM strength that can be found here.



SEIZING THE OPPORTUNITY



The Great Lakes Bay Region has an opportunity to be a national leader in developing a pipeline of talent in science, technology, engineering and math that drives regional prosperity. This STEM talent can propel existing businesses as well as attract new organizations that need people with STEM skills. The key to that leadership is enlightened cooperation between employers and the many people who are dedicated to training the workforce of tomorrow. Such region-wide, cross-functional cooperation is virtually unheard of around the country, giving the Great Lakes Bay Region the ability to take the lead in this game-changing area.

A roadmap for achieving STEM leadership has been provided by the Great Lakes Bay Region STEM Impact Initiative. After extensive research and expert analysis, the Initiative identified specific steps that will result in a robust STEM talent pipeline.



STEM Impact Initiative Mission

To build the workforce of tomorrow through comprehensive STEM education and training to meet the growing needs of current employers and to attract new jobs and companies to the Great Lakes Bay Region.

RESEARCH

In setting out to fulfill its mission, the Task Force conducted a nationwide search for researchers with the expertise necessary to gather data about the region and make recommendations. They selected a team of two highly respected organizations, Accenture and Innovate+Educate. Accenture is a multi-billion-dollar consulting company dedicated to helping clients become high-performance businesses and governments. Its strengths include research and technology. Innovate+Educate is an industry-led nonprofit implementing research-based strategies to close the national skills gap and bridge the opportunity divide. Its strengths include program delivery at the community level and development of practical tools and services.



3 Months of Analysis
(May 2014 - August 2014)



150+ Interviews with Key Stakeholders



5 Focus Groups with K-12 Teachers, Principals, Curriculum Directors, and College Access Network Organizations



8 Surveys Conducted with More than 1,500 Responses Received



Custom Economic and Workforce Data Analysis Using Real-time Labor Market Intelligence and Other Tools

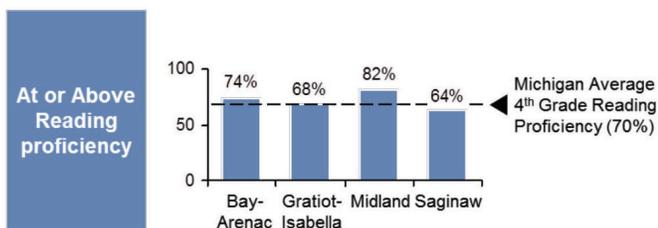


3 Meetings with Community Leaders to Solicit Input on Findings and Recommendations and to Build Community Engagement in the STEM Impact Initiative

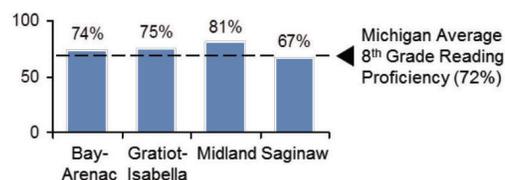
Researchers gathered a wealth of data about Bay, Gratiot, Isabella, Midland and Saginaw counties through a variety of methods.

The data included demographics, enrollment figures, test scores for local students, inventories of existing STEM programming, economic data, employment projections and many other facts. Researchers sought input from parents, students, teachers, school administrators, business leaders and others with insight into STEM education.

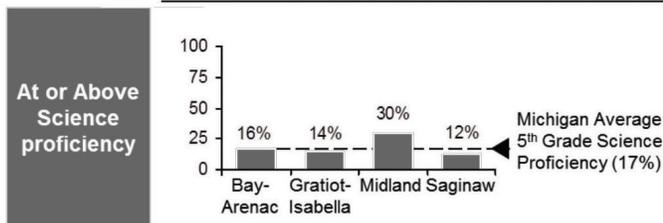
2013 MEAP 4th Grade Reading Low Proficient and Above



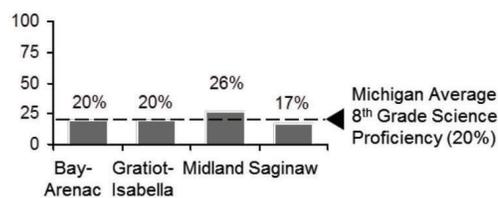
2013 MEAP 8th Grade Reading Low Proficient and Above



2013 MEAP 5th Grade Science Low Proficient and Above

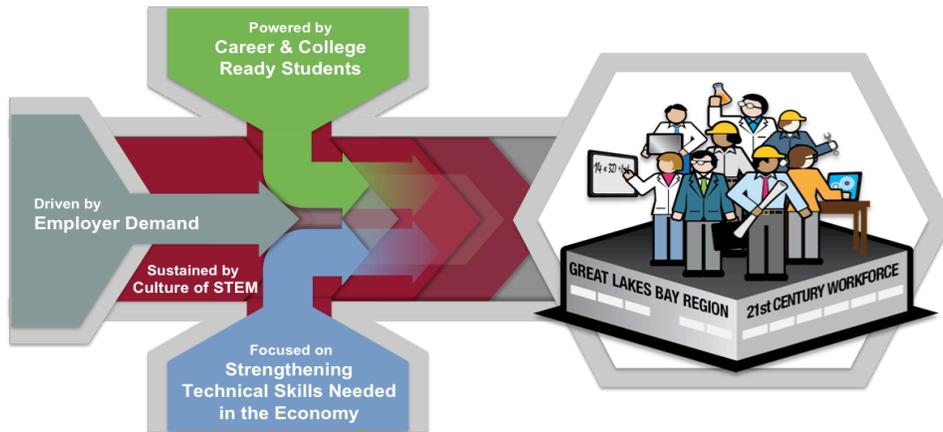


2013 MEAP 8th Grade Science Proficient and Above

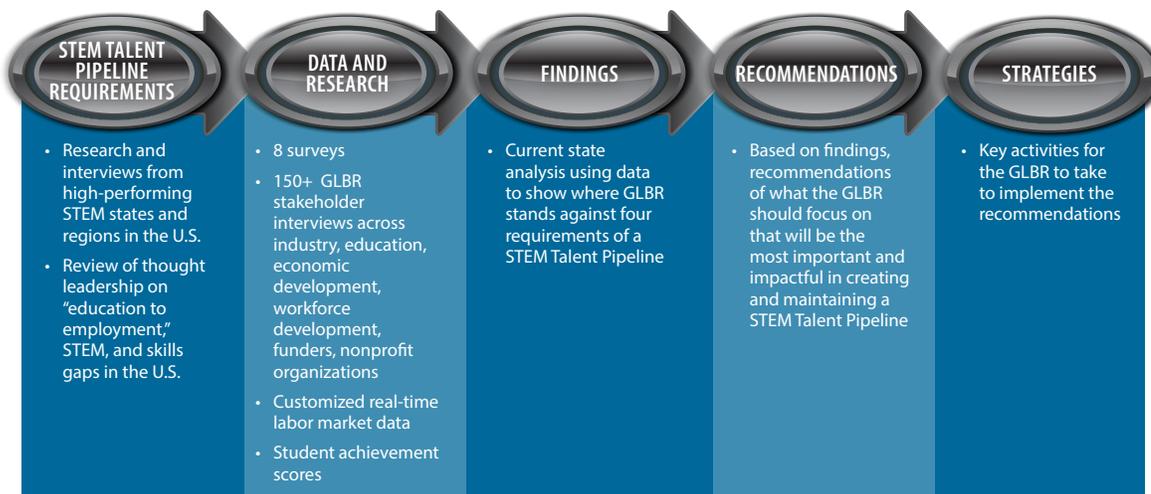


FINDINGS

Based on this research, the STEM Impact Initiative has identified four requirements for an effective STEM talent pipeline: Driven by Employer Demand, Powered by Career-Ready and College-Ready Students, Strengthening Technical Skills Needed in the Economy, Sustained by a Culture of STEM.



The four requirements serve as the framework on which the current state of STEM talent development in the Great Lakes Bay Region is analyzed, as shown in the graphic below. Researchers examined the data gathered from the region to find important facts about where the region stands from the perspective of each requirement. From there, they recommended areas where the region should focus its efforts to make improvements. Then, for each recommendation, researchers identified strategies for making those improvements.

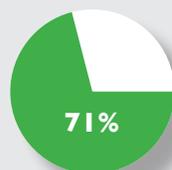


What follows is the result of this process, a broad view of the data, findings, recommendations and strategies for each of the four requirements for an effective STEM talent pipeline.

DRIVEN BY EMPLOYER DEMAND

KEY DATA

- **53%** of employers indicated that applicant availability has prevented them from developing new products or services
- **27%** of companies do not post jobs online; In some cases, employers only create one posting even if they are looking to hire for multiple positions



71% of employers reported having difficulty hiring for a STEM job within the last 12 months

KEY FINDINGS

- Economic growth is constrained due to challenges finding qualified STEM talent
- Employers struggle to find STEM talent due to a lack of technical skills, soft skills, and required experience
- It is difficult to get a clear picture of the region's talent needs because of a lack of transparency around current and future (short-term) demand
- Employer job expectations are confusing due to a lack of common language used across industries and between industry and education

RECOMMENDATIONS

I.1. Specify needed technical and workplace skills and competencies for high-demand positions

I.2. Forecast near-term demand and aggregate STEM workforce requirements

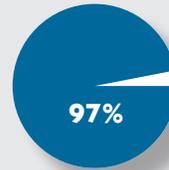
STRATEGIES

- | | |
|--|---|
| <ul style="list-style-type: none"> I.1.a. Bring together employers to identify in-demand skill sets and competencies and develop representative job profiles I.1.b. Develop a standardized approach for defining skill requirements on an ongoing basis and build support for this approach within employer community I.1.c. Build standardized processes by which employers regularly communicate skills and competencies to skill providers | <ul style="list-style-type: none"> I.2.a. Convene industry organizations to take the lead on industry-specific aggregation efforts I.2.b. Develop survey tools that industry organizations can use to gather employer forecasts I.2.c. Aggregate demand, supplement with external labor market data, and communicate results I.2.d. Support efforts to enable continuous demand forecasting, aggregation, and communication to training providers I.2.d. Support continuous demand forecasting to training providers |
|--|---|

POWERED BY CAREER-READY AND COLLEGE-READY STUDENTS

KEY DATA

- Approximately **36%** of Michigan high school students entering college require math remediation, 13% higher than the national average
- More than **85%** of GLBR superintendents believed STEM is very important, compared to 52% of principals and 28% of teachers



97% of all STEM jobs require foundational math skills with most requiring proficiencies by 7th grade

KEY FINDINGS

- Strong math, science and literacy skills are the core competencies required for a strong STEM workforce
- Student achievement in math and science will need to increase significantly to assure a STEM-ready workforce
- Students at or below the poverty level have lower math achievement; however, there is equal room for improvement among all students for higher achievement in math
- School administrators and teachers are not always aligned on the STEM agenda
- Measurement of STEM programming effectiveness is limited
- There is limited STEM-focused professional development
- The STEM teacher pipeline is declining
- Pre-kindergarten programming is important for child development but has no conclusive direct correlation to STEM achievement

RECOMMENDATIONS

2.1. Improve 5th-8th grade math achievement

2.2. Increase in-classroom, research-based K-12 STEM-aligned programming with evidence of increasing interest in science

2.3. Increase the number of out-of-classroom experiential STEM learning opportunities

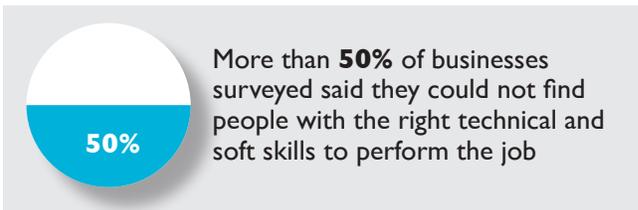
STRATEGIES

- | | |
|--|---|
| <p>2.1.a. Provide research-based, proven, professional learning programs for 5th – 8th grade teachers based on best practice pedagogy which have evidence of increasing student achievement</p> <p>2.1.b. Develop and implement a structured process of data-driven, formative assessments and use research-based interventions to address gaps in student learning with appropriate support resources in the form of curriculum coaches and math specialists</p> <p>2.1.c. Establish agreed-upon math improvement measures that will be used across all school districts</p> <p>2.1.d. Integrate research-based programs at colleges of education that increase math pedagogy for incoming teachers</p> | <p>2.2.a. Implement evidence-based programs for K-12 that show increase in STEM interest, especially in science</p> <p>2.2.b. Scale project-based learning methodologies for STEM learning</p> <p>2.2.c. Leverage STEM Subject Matter Experts to supplement curriculum and add workplace experience into classrooms with continuity across all grades</p> <p>2.3.a. Increase the availability of evidence-based, out-of-classroom STEM experiential learning opportunities for K-12</p> <p>2.3.b. Target and scale evidence-based programs for girls and minorities</p> |
|--|---|

FOCUSED ON STRENGTHENING TECHNICAL SKILLS NEEDED FOR THE ECONOMY

KEY DATA

- A majority of employers said the highest level of education needed to fill hard-to-fill STEM positions was either a high school diploma/GED or 2-year degree/certificate
- Only 3 of Michigan's 40+ CTE programs have master agreements in place that ensure acceptance at all public universities and community colleges



KEY FINDINGS

- The quantity of highly skilled technical workers coming from technical skill training programs is not sufficient to meet current and future demand
- Inadequate access to CTE programs is one of the main drivers of this gap
- Dated mindsets persist among community stakeholders around technical skill-based careers
- There is limited use of Work Keys or other credentials to certify readiness for technical (or STEM) careers

RECOMMENDATIONS

3.1. Align programming and curricula with employer requirements

3.2. Scale STEM experiential learning opportunities

STRATEGIES

- | | |
|--|---|
| 3.1.a. Engage educators to evaluate structure of curricula/programs | 3.2.a. Obtain commitments from employers who are willing to offer experiential learning opportunities |
| 3.1.b. Convene educators to evaluate curricula against employer skill requirements, identify gaps, and refine curricula | 3.2.b. Increase job shadowing, internships, apprenticeships and co-ops for high school, 2-year and 4-year students |
| 3.1.c. Communicate the expected skills and competencies for graduates of regional training programs | 3.2.c. Develop streamlined process and universal application to facilitate easier onboarding process for employers and students |
| 3.1.d. Utilize assessments and credentials to measure job seeker skills against technical requirements on an ongoing basis | 3.2.d. Develop externships for educators to further refine STEM career knowledge |
| 3.1.e. Build standardized feedback mechanism for continuous improvement of programming | |

SUSTAINED BY A CULTURE OF STEM

KEY DATA

- **87%** of parents wanted to see more STEM opportunities in the classroom
- **90%** of teachers report that their students have five or fewer exposures to STEM jobs each year
- **62%** of principals indicated that there are no STEM elective classes offered at their school



89% of parents rank STEM education to be important for their children's development

KEY FINDINGS

- There is no common definition of STEM within the GLBR
- “Random acts of STEM” are not aligned with a common agenda or supported by metrics to evaluate effectiveness
- GLBR parents are interested in STEM, but not always aware of STEM program opportunities
- Students have limited exposure to and understanding of different STEM occupations
- Parents feel the primary barrier to student engagement in STEM-related activities is a lack of interest
- Businesses are generally willing to help increase STEM awareness, but require direction from education
- Females perform on par or better than males in core STEM competencies, but are underrepresented in STEM careers in the region

RECOMMENDATIONS

4.1. Change perceptions and increase interest in STEM

4.2. Eliminate barriers and incentivize students and job seekers to pursue STEM careers

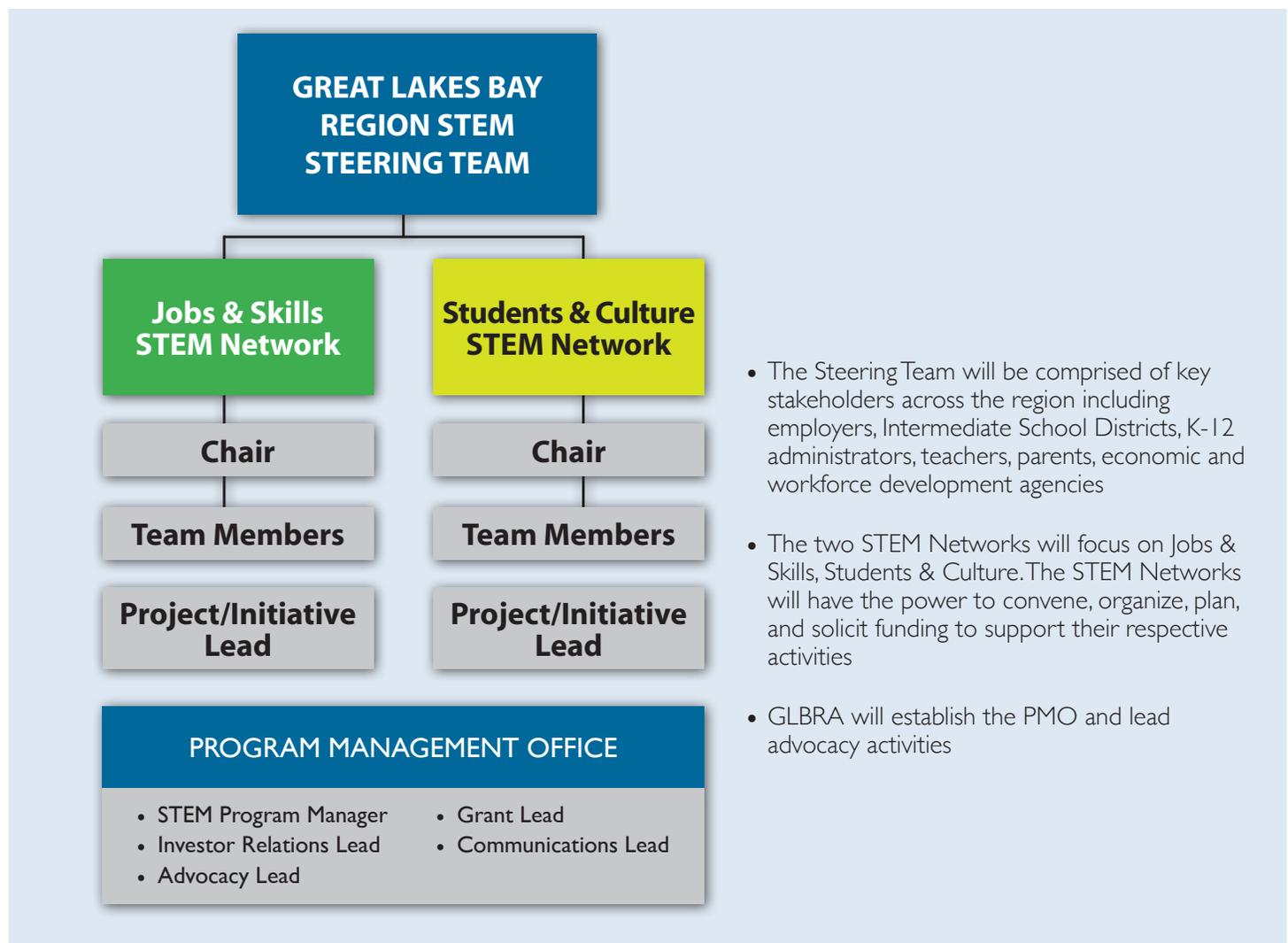
STRATEGIES

- | | |
|--|--|
| <ul style="list-style-type: none"> 4.1.a. Launch targeted marketing campaigns to increase STEM awareness supported by regional STEM spokesperson(s) and website/portal 4.1.b. Develop materials to educate guidance and career counselors on STEM opportunities, resources, and tools (e.g. online career pathways) 4.1.c. Develop and execute recurring student, parent, and teacher surveys to measure interest in and awareness of STEM 4.1.d. Develop requirements and identify host for region-specific career exploration tools 4.1.e. Engage students in the championing of STEM in the region | <ul style="list-style-type: none"> 4.2.a. Support expansion of STEM scholarships by identifying areas of highest need and identifying funders to fill those needs 4.2.b. Convene educators to: <ul style="list-style-type: none"> • Increase credit value and expand number of articulation agreements between CTE, 2-year and 4-year universities • Develop plan to embed industry-recognized credentials into curricula • Examine national models for STEM early college • Address availability/access to technology in schools |
|--|--|

CONCLUSION

The Great Lakes Bay Region STEM Impact Initiative Summit is the beginning of the process of turning this research and analysis into action. People from business, education, community and other backgrounds have come together to find out how each can play a part in turning STEM into a strength of the region. Such cross-functional communication and cooperation is the path to a future that benefits everyone.

The STEM Impact Initiative lays the groundwork for continuing the momentum established at the Summit into the future. Researchers have recommended creation of four new groups that will fill specific roles in transforming the region's STEM talent pipeline. The groups include the GLBR STEM Steering Team, the Jobs and Skills STEM Network, the Students and Culture STEM Network and the Program Management Office, which would focus on region-wide communication, advocacy and funding.



With 32 specific action strategies organized under the framework of the four requirements for an effective STEM talent pipeline, the STEM Impact Initiative has provided the recipe for making the Great Lakes Bay Region a global leader. Now it is time for everyone who is committed to STEM education to make it happen.

The Great Lakes Bay Regional Alliance is a nonprofit organization that fosters cooperation on the part of leaders from across Bay, Isabella, Midland and Saginaw counties. Its focus on strengthening the region's prestige and investing in its prosperity makes it well suited to lead an effort to study the STEM preparation available to area students and possibilities for aligning that preparation with the needs of the region's employers. In the Fall of 2013, the Alliance's Education Council expanded its membership to include more business and education leaders. The Education Council members include:

- CAROLYN WIERDA**, Chair, Interim Associate Dean/Executive in Residence,
College of Education, Saginaw Valley State University
- JAN AMSTERBURG**, Superintendent, Gratiot-Isabella RESD
- DAVID BROWN**, Stem Coordinator, Science/Math Teacher, Bullock Creek School District
- DEB DUNBAR**, Bay Area Learning Associates/Contracted Consultant for GLBRA
- MATT FELAN**, President/CEO, Great Lakes Bay Regional Alliance
- DEBORAH KADISH**, Superintendent, Bay Arenac ISD
- CHIP HENDRICK**, President, R.C. Hendrick and Son Inc.
- DENNIS HOEG**, Vice President of Global Manufacturing, Engineering and Enterprise Systems, Nexteer
- NANCY LAMB**, Public Affairs/Michigan Operations, The Dow Chemical Company
- BRIAN LECHER**, College and Career Advisor, Saginaw Intermediate School District
- DOUG NEWCOMBE**, Superintendent, Bay City Public Schools
- DAVID PERUSKI**, Dean of Teaching and Learning, Delta College
- TERRIE ROBBIE**, MYP/STEM Coordinator, Saginaw Township Community Schools
- JOHN SEARLES**, Superintendent, Midland ESA
- MIKE SHARROW**, Superintendent, Midland Public Schools
- KATHY STEWART**, Superintendent, Saginaw ISD
- RAY STEPHENS**, Human Resource Manager, Hemlock Semiconductor
- ELLEN TALBOTT**, Vice President of Patient Care Services, McLaren-Bay Region
- DOUG TROMBLEY**, Superintendent, Saginaw Township Schools
- ROB VALLENTINE**, Director of Global Corporate Citizenship and President of the Dow Chemical Foundation,
The Dow Chemical Company
- CHRIS VELASQUEZ**, Business Development Manager, Dow Corning Corporation



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