



MiSTEM Network Region #8 2022-2023 Strategic Plan

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Needs Assessment

Participating Stakeholder	Affiliation
Abraham Jones	Wolverine World Wide
Al Cumings	Tri-County Area Schools
Angela Hill	U.S. Federal Gov. Public Sector GTM Programs at Palo Alto Networks
Angie Barksdale	West Michigan Works!
Bernard Brown	Newaygo County RESA
Cary Stamas	Kent ISD
Casey Thelenwood	GVSU
Crystal Scott-Tunstall	GVSU
Erin Koren	Grand Rapids Public Museum
Heidi Kattula	East Grand Rapids Public Schools
Jason Pasatta	Ottawa Area ISD
Joanna Udo	Spectrum Health
John Vancil	OST (Open Systems Technologies)
Kelli Brockway	Kent ISD
Kyle Fiebig	Muskegon Area ISD
Mandy DeWilde	Heart of West Michigan United Way
Mark Thomas	Northview Public Schools
Michelle Beracy	Tanium
Olivia Blomstrom	The Right Place
Patrick Horn	Lakeshore Museum Center
Susan Gunn	Davenport University
Region 8 ISD/RESA Consortium	All ISD/RESA staff in the Greater West Michigan Region were asked to provide input for our needs assessment.

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Data Sources:

Data Type	Source
Workforce	• West Michigan Career Outlook Through 2028 • Region 8 CTE Programs Offered by County • Right Place West Michigan Overview (2021) • Greater Grand Rapids Tech Strategy (Right Place, Sept 2022) • 2022 Region 4 Annual Planning Information and Workforce Analysis Report (DTMB)
Student/Education Data	• Summary of Data from MI School Data Education Dashboard ◦ Allegan Area ESA EducationDashboard.pdf ◦ Kent ISD EducationDashboard.pdf ◦ Montcalm Area ISD EducationDashboard.pdf ◦ Muskegon Area ISD EducationDashboard.pdf ◦ Newaygo County RESA EducationDashboard.pdf ◦ Ottawa Area ISD EducationDashboard.pdf • MCAN West Michigan Performance Overview - Impact Map.pdf • 2022 State of Computer Science Education
Stem Opportunity Index	Region 8 STEM Opportunity Index
Other	• The State of U.S. Science and Engineering 2022 (National Science Board) • State of Girls and Women in STEM (March 2022) • MI Afterschool Fact Sheet 2022 • Regional Data from MASP 2021 Data Project: ◦ Allegan and Muskegon County Limited Data.docx ◦ KentProfile_Draft2_ed.pdf ◦ MontcalmProfile_Draft1_ed.pdf ◦ NewaygoProfile_Draft1_ed.pdf ◦ OttawaProfile_Draft1_ed.pdf • ALICE (Asset Limited, Income Constrained, Employed) Report, 2021 • Data Maps – Rising Income for All

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Needs Statements:

NS1 Equity	STEM courses, electives, CTE programs, and out-of-school STEM programs are not distributed equally among the 64 public school districts in Region 8. This includes advanced coursework in computer science as well as engineering, robotics, and other technical areas. Disparities continue to exist in STEM achievement. The National Science Board's Science and Engineering Indicators Elementary and Secondary STEM Education July 2021 Report summarizes the key findings: • Differences persist in U.S. science, technology, engineering, and mathematics (STEM) achievement scores by socioeconomic status (SES) and race or ethnicity. • Differences in U.S. STEM achievement scores by sex are smaller than those by SES or race or ethnicity but are present; male students slightly outscored female students on some national assessments, although female students substantially outscored male students on a computer information literacy exam. • Less experienced STEM teachers (as measured by years of teaching) are more prevalent in schools with high-minority enrollment or high-poverty enrollment. • Data collected on U.S. remote learning in spring 2020 (during the COVID-19 pandemic) revealed differences in access to technology based on household income: 57% of households with income below \$25,000 always had a computer available for educational purposes, whereas 90% of households with an income of \$200,000 or more did so. According to the Pew Research Center, Black and Hispanic workers remain underrepresented in the science, technology, engineering and math (STEM) workforce compared with their share of all workers, including in computing jobs, which have seen considerable growth in recent years. The representation of women varies widely across STEM occupations. Women make up a large majority of all workers in health-related jobs, but remain underrepresented in other job clusters, such as the physical sciences, computing and engineering. We need to address persistent disparities in STEM education and careers. It is critical to develop and implement strategies that attract and retain students and professionals in STEM from underserved populations (Broadening Participation in STEM: Evidence-based Strategies for Improving Equity and Inclusion of Individuals in Underrepresented Racial and Ethnic Groups).
NS2 Career and college awareness	According to Michigan's Long-term Employment Projections, STEM occupations are expected to grow by 13 percent from 2016 to 2026, almost double the 7 percent overall growth expected during the period. In fact, many STEM job titles are expected to grow much faster than average (Labor Market News, DTMB). The more exposure students have to future career opportunities and the world of work, the more likely they are to choose a career that's right for them. Schools need to provide students with more educational and vocational STEM-related activities to

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	further develop their STEM college learning and career orientation, as well as to put learned STEM knowledge into real-life practice (Rivera, Li, 2020). When students participate in STEM-related activities in informal learning environments, such as STEM summer camps, their STEM learning interests and career orientation are enhanced (Nugent et al., 2015). We need to improve opportunities for collaborations between students, higher education and business to support college and career awareness and regional employment needs, especially high demand, high wage careers.
NS3 Elementary Science and Literacy	“Scientific thinking and understanding are essential for all people navigating the world, not just for scientists and other science, technology, engineering and mathematics (STEM) professionals. They enable people to address complex challenges in local communities and at a global scale, more readily access economic opportunity, and rein in life-threatening problems such as those wrought by a global pandemic. In this way, knowledge of science and the practice of scientific thinking are essential components of a fully functioning democracy. Science is also crucial for the future STEM workforce and the pursuit of living wage jobs.” (Call to Action for Science Education Building Opportunity for the Future, 2022) “Science learning takes significant time—but that time is not being provided. A recent study shows that science instructional time is decreasing in elementary school. Only 20% of K-3 students and 35% of students in grades 4-6 have access to daily science instruction.” (STEM Teaching Tools, Practice Brief 43) Survey data gathered by Science Consultants in our Region as well as anecdotal evidence from district staff confirms that science instruction is not taking place in many elementary schools across our region, and in some cases, not in middle school and high school. If reading and science could be integrated and common skills and processes combined, the time allotted to both subjects could be used to cover more of the common ground needed. This approach is much more than an efficient use of classroom time, integrating these two subjects has been found to increase student achievement in both areas as well (Science and Children, 2005). We need to support ways to integrate science and literacy in order to help teachers creatively and effectively address learning standards in both disciplines while maximizing efficiency within the school day.
NS4 Computer Science	“Demand for tech talent in greater Grand Rapids is forecasted to grow across industry sectors in the coming years, with cybersecurity, A.I., cloud-based computing and machine learning leading the field. As women, Black, Indigenous and Hispanic people remain underrepresented in tech, attracting a more diverse workforce will be a key component of the regional strategy.” Greater Grand Rapids Tech Strategy (Right Place, Sept 2022)

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	"Computing is used all around us and in virtually every field. It's foundational knowledge that all students need, but computer science is marginalized throughout education. Only 51% of U.S. high schools teach any computer science courses and only 4% of bachelor's degrees are in Computer Science. We need to improve access for all students, including groups who have traditionally been underrepresented." (Michigan State Fact Sheet - Code.org)
NS5 Mathematics	"Mathematics is increasingly needed to understand the world today and fully engage in democratic society (NCTM, 2018). All members of society, if they are to make informed choices for themselves, their families, and their communities, need to be quantitatively literate and to have an understanding of quantitative, scientific, and technological issues far beyond what was once adequate." (NCSM, NCTM Building STEM Education on a Sound Mathematical Foundation) Workforce development organizations and businesses in our region have indicated that mathematics literacy is a key need for employment in our region. "Any STEM education program (including out-of-school activities) should support and enhance a school's mathematics program, ensuring that instructional time for mathematics is not compromised. In addition, any STEM activity claiming to address mathematics should do so with integrity to the grade level's mathematics content and mathematical practices. (NCSM, NCTM Building STEM Education on a Sound Mathematical Foundation) We need to support opportunities for students to develop a strong mathematics foundation in order for them to succeed in STEM fields and to make sense of STEM-related topics in their daily lives.

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Strategic Plan

Culture (Priority Area) - Bring together STEM actors within and across regions in a research-informed way

- **Strategy #1 Transform STEM learning with innovative and integrated 3P instruction opportunities**
- **Strategy #2 Create business-community-education STEM partnerships**
- **Strategy #3 Build equitable, inclusive change by investing STEM resources and opportunities in places with demonstrated need**
- **Strategy #4 Scale STEM successes in our regions related to MiSTEM goals and culture**

State Level

The core of the state-level work is to support the understanding, evaluation, and execution of the strategies listed above.

Action Item (Resource: Sample Regional Actions)		Strategies *checkmark for all that apply*				Measure Name the data, not the evaluator	Timeline	Person(s) Responsible
		1	2	3	4			
R.1	Support out-of-school STEM learning and STEM career awareness opportunities across the region with a focus on students traditionally underserved in STEM (Junior Achievement STEM events, STEAM Along the Lakeshore, Regional Math and Science Center summer camps and STEM days, STEM Greenhouse programs, Muskegon Informal STEM/STEAM Consortium, etc.)	✓	✓	✓	✓	# of students participating and proportion of underserved populations, # of business & community partners	2022 to 2023	Ginger Rohwer Diane Miller RMSC Staff

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R.2	Continue to facilitate the STEM Networked Improvement Community (NIC) to develop students' identities as problem-solvers and innovators	☒	☒	☒	☐	# of members, # of programs, increase in student innovation stance	2022 to 2025	Ginger Rohwer Higher Ed Researcher, Co-PI on research study
R.3	Continue to support the West Michigan PBL Network through the development of the website	☒	☒	☐	☒	# of projects on site, # of educator blog posts, # of members	2022 to 2023	Ginger Rohwer Website Content Developer ISD PBL Program Developers
R.4	Continue to support the Science and Literacy Integration Collaboration (SLIC)	☒	☐	☒	☒	#of participants, # of students impacted	2022 to 2023	Ginger Rohwer ISD Science and Literacy Consultants
R.5	Develop and pilot the Greater West Michigan Region ArcGIS StoryMap to connect business, workforce, careers, employment opportunities, and educators Expand the YouTube channel for videos highlighting STEM careers As part of the ArcGIS Story Map project, identify how Information Technology is embedded in businesses and industry in our region	☒	☒	☐	☒	# of page views, # of new users	2022 to 2023	Diane Miller

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R.6	Offer STEM mini-grants to K-12 teachers and out-of-school time programs to support community connected projects	☒	☒	☒	☐	# of projects funded, # of educators, # of project partners, # of students impacted	2022 to 2023	Ginger Rohwer Diane Miller Olga Kryger
R.7	Participate in the Expanded Learning Opportunities (ELO) STEAM PLC	☒	☐	☒	☐	# of connections made	2022 to 2023	Ginger Rohwer RMSC Staff
R.8	Support the STEM Network hosted by Kent ISD	☒	☒	☒	☒	# of participating educators, #of students impacted, # of connections to partners	2022 to 2023	Ginger Rohwer ISD STEM and Educational Technology Consultants
R.9	Support integrative and innovative project-based, place-based, and problem-based learning experiences in K-12 classrooms (Godfrey Lee, Godwin Heights, Ottawa PBL+Math, GLSI Hubs, Prisms' VR, etc.)	☒	☒	☒	☒	# of educators trained, # of students impacted, # of community partners, # of connections to partners	2022 to 2023	Ginger Rohwer Diane Miller ISD STEM, Educational Technology, Science, Math, and Career Readiness Consultants GLSI Hub Staff
R.10	Participate in each of the Math, Science & Engineering, and Computer Science Advisory Council Action Area activities as aligned to the Action Areas' 4-year strategic plans	☒	☒	☒	☒	TBD	2022 to 2023	Ginger Rohwer AA Leads

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Strategic Plan Narratives

Narrative: correlation to outcomes in pillars:

Pillar 2: Empower STEM teachers

Pillar 3: Integrate Business & Education

The Strategic Plan for Region 8 connects to all four pillars. We are supporting the **STEM culture** in our region through multiple initiatives including the West Michigan PBL Network (R.3), STEM Networked Improvement Community (R.2), STEM Network (R.8), and Expanded Learning Opportunities (ELO) STEAM PLC (R.7).

Our region works to **empower teachers** through professional learning, capacity building, and connections to community partners through projects like the West Michigan PBL Network (R.3), STEM Network (R.8), Science and Literacy Integration Collaboration (R.4), Greater West Michigan Region ArcGIS StoryMap (R.5), STEM Mini-Grants (R. 6), supporting integrative and innovative project-based, place-based, and problem-based learning experiences in K-12 classrooms (R.9), and participating in each of the Math, Science & Engineering, and Computer Science Action Area activities as aligned to the Action Areas' 4-year strategic plans (R.10).

We work to **integrate business and education** through multiple initiatives including supporting out-of-school STEM learning and STEM career awareness opportunities across the region (e.g. STEAM Along the Lakeshore, Junior Achievement STEM events, Regional Math and Science Center summer camps and STEM days, Muskegon Informal STEM/STEAM Consortium, etc.), the Greater West Michigan Region ArcGIS StoryMap (R.5), the West Michigan PBL Network (R.3), STEM Networked Improvement Community (R.2), STEM Network (R.8), and supporting integrative and innovative project-based, place-based, and problem-based learning experiences in K-12 classrooms (R.9).

Our region supports **high-quality STEM experiences for students** through out-of-school STEM learning and STEM career awareness opportunities across the region (e.g. STEAM Along the Lakeshore, Junior Achievement STEM events, Regional Math and Science Center summer camps and STEM days, Muskegon Informal STEM/STEAM Consortium, etc.) and supporting integrative and innovative project-based, place-based, and problem-based learning experiences in K-12 classrooms (R.9).

Narrative: correlation to needs assessment, in particular the equity area

Our first needs statement, N.1, recognizes that STEM courses, electives, CTE programs, and out-of-school STEM programs are not distributed equally among the 64 public school districts in Region 8. This includes advanced coursework in computer science as well as engineering, robotics, and other technical areas.

In order to address inequities in our region, we are supporting out-of-school STEM learning and STEM career awareness opportunities across the region with a focus on students traditionally underserved in STEM (R.1) including STEM Greenhouse programs, STEAM Along the Lakeshore, Junior

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Achievement STEM events, Regional Math and Science Center summer camps and STEM days, and Muskegon Informal STEM/STEAM Consortium. In particular, STEM Greenhouse is an organization founded by a person of color who is committed to growing STEM proficiency in vulnerable children to cultivate education and career success in Grand Rapids, Michigan and beyond.

Another way that we are addressing inequities is through selection criteria used for evaluating STEM Mini-Grant applications. We include student demographic information such as ethnicity and percent of economically disadvantaged students as a factor for awarding grants.

Finally, as we support integrative and innovative project-based, place-based, and problem-based learning experiences in K-12 classrooms, we are placing a priority on districts with a high percentage of students of color and high percentage of economically disadvantaged students (e.g. Godfrey Lee, Godwin Heights, West Ottawa).

Narrative for how regional actions support state action items (stakeholders involved, need addressed, etc.)

Each of the action items have been craft with the core of the state-level work in support the understanding, evaluation, and execution of the state strategies:

- Strategy #1 Transform STEM learning with innovative and integrated 3P instruction opportunities
- Strategy #2 Create business-community-education STEM partnerships
- Strategy #3 Build equitable, inclusive change by investing STEM resources and opportunities in places with demonstrated need
- Strategy #4 Scale STEM successes in our regions related to MiSTEM goals and culture

Additional Information

R.1

The 2022 [Advanced Manufacturing Camp](#) was a five-day hands-on immersive experience for students entering 6th and 7th grade hosted by the Regional Math and Science Center in collaboration with the MiSTEM's Network Greater West Michigan Region, the Seymour and Esther Padnos College of Engineering & Computing, and the Women in Manufacturing Association. Campers participated in large group activities that included team-building and design thinking processes - followed by breakout sessions facilitated by GVSU staff, students, and industry professionals from the West Michigan area. Sessions included hands-on activities such as Computer-Aided-Design (CAD), 3-D Printing, Automation, Design Thinking, and Lean Manufacturing. Career Exploration activities included off-site industry tours to Pridgeon & Clay, DeWys, and JR Automation. The camp ended with a career fair and career pathway panel discussion with Pridgeon & Clay, Autocam, Micron Manufacturing, Gentex, Bucher Hydraulics, Amphenol Borisch Technologies, DeWys, and JR Automation.

[Energizing Our World \(EOW\)](#) is an exploration into the world of renewable energy. EOW Summer Camp is a one week summer camp exploration for middle school students designed to spark interest in renewable energy sources and careers. Students will perform hands-on experiences with a

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variety of renewable energy sources and will have the opportunity to engage in activities involving solar, wind, and hydro power created and facilitated by GVSU faculty, staff and students. An introduction to careers in renewable energy will also be a part of the camp. EOW Saturday provides an opportunity for students to interact with a variety of renewable energy sources while participating in hands-on activities created and facilitated by GVSU faculty, staff and students in a one day format.

[STEAM Along The Lakeshore](#) is an annual event in Muskegon, Michigan that promotes STEAM learning for the entire family. The event aims to increase awareness and excitement in students and their families about classes and careers in STEAM fields and bring awareness to local community organizations, including activities and resources that are always available to families in our community.

[STEM Greenhouse](#) was formed in 2014 by Dr. Keli Christopher. STEM Greenhouse aims to address the lack of diversity within the STEM professions. As a girl in an inner-city school who lacked confidence in math, Dr. Christopher never imagined that she would become the first Black person to get a Ph.D. in Agricultural Engineering from the University of Illinois and the third black woman in the world to hold a Ph.D. in that field. After working as an engineer and educator, Dr. Christopher started a science and math education business focused on fun, hands-on science and math experiences for K-12 students. Working with students throughout the greater Grand Rapids area gave her further insight into the inequality in STEM education among various districts, races, genders, and socioeconomic classes. The [2022 Sankofa STEM Academy Village of Support - YouTube](#) video describes Sankofa Academy, one of the programs that Region 8 has supported.

The [JA Girls' Dream Fair](#) will inspire hundreds of seventh and eighth grade girls in West Michigan. Students from Grand Rapids, Northern Michigan, Lansing, Battle Creek/Kalamazoo, Holland, and the Lakeshore are invited to participate in this unique opportunity. In a TED-style talk, JA will introduce these students to women mentors who work in STEM related fields and show them the exciting possibilities for their future. As the research suggests this is key in increasing their pursuit of STEM careers. Guided by JA's It's My Future curriculum, students will investigate, ask questions and be inspired to consider STEM for their future.

R.2

The [STEM Networked Improvement Community \(NIC\)](#) is a group that is focusing on exploring how we might *develop students' identities as collaborative problem-finders/solvers and innovators*. We want to design experiences that result in students believing *"We can solve problems collaboratively right here in my community, right now using what we know."* Programs include Ottawa Area ISD's [FuturePREPd Program](#), Grand Haven Area Public School's [Ferry Elementary and Voyager School](#) program, Muskegon Area ISD's 3P Learning program including the [Project-Based Learning at Reeths-Puffer Central Elementary School](#), [Groundswell Stewardship Initiative](#), and the Outdoor Discovery Center's collaboration with [Forest School/Pine Ridge Elementary](#).

R.3

The [West Michigan PBL Network](#) website is a multi-county collaboration in Region 8 to support educators in project-, place-, and problem-based learning. The site contains about 100 examples of projects that educators have facilitated in their classrooms, resources for educators, and

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examples of business and community partners.

R.4

The [Science and Literacy Integration Collaboration](#) (SLIC) aims to increase instructional time in science with literacy practices. The Collaborative involves professional learning for coaches and teachers around the Essential Practices in Early Literacy (K-3) and Science Instruction. The areas of focus within Science & Literacy Instruction include text sets, academic productive talk, and writing (vocabulary is integrated throughout). Educators also participate in a coaching cycle and collaborative network which results in improved instructional practice and an increase in academic discourse for sensemaking.

R.5

The [Greater West Michigan Region ArcGIS StoryMap](#) is a spatial tool that combines interactive maps, text, and other multimedia content for STEM career awareness, exploration, and development for students, parents, adult job seekers, and the community. The StoryMap will function as a statewide database and tool to visualize and access workforce data in a unique and useful way.

Designed to communicate the physical location of business partners and industry clusters in Michigan, users will have the tools to identify opportunities for making better career decisions. Students and adults can use these resources to help them prepare for higher education, credentials, and the future STEM workforce.

The map highlights:

- high-wage and high-demand careers
- apprenticeship and internship opportunities
- industry cluster data

R.6

The Greater West Michigan Region [STEM Mini-Grant](#) program supports educators in the teaching and learning of STEM in K-12 classrooms and out-of-school time programs. The emphasis is on stimulating new teaching ideas and new learning opportunities made possible through the creative spark of educators. An additional emphasis is placed on developing community outreach projects in which students and schools work with local business partners and community organizations to solve local problems and develop career awareness, exploration, or preparation.