



WESTERN MICHIGAN UNIVERSITY



Western Michigan University's CoreKids Program: K-12 Outreach using Student Educators

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WMU Geological and Environmental Sciences Outreach Platform

- On-campus – the **Lloyd Schmaltz Geology and Mineral Museum, Rock Garden, and Dinosaur Park** - tours
- **Michigan Geological Repository for Research and Education** – off-campus home of the Michigan Geological Survey – tours, professional training (teachers workshops and professional geologists workshops)
- **CoreKids Program** – external outreach activities – school visits, booths at allied partner events (other Museums, mineral shows, etc.)
- **CoreKids Website** – resources, links to high quality websites for various Geo-topics, Program Annual Reports and News (<https://wmich.edu/corekids>)
- Combined impact – on order of 20,000+ people per year

WMU Geological and Environmental Sciences Outreach Platform

—Facilities and activities

- **Rood Hall** – main campus – the **Lloyd Schmaltz Geology and Mineral Museum, Rock Garden, and Dinosaur Park** - tours
- **Michigan Geological Repository for Research and Education (MGRRE)** – near campus – tours, professional training, workshops for teachers and professional geologists – hosts the Michigan Geological Survey (MGS)

—**CoreKids Program** – external outreach activities – school visits, exhibits at partner events (other Museums, mineral shows, etc.)

—**CoreKids Website** – resources and links to websites with great content for Geo-topics and classroom planning, and Program Annual Reports and News
(<https://wmich.edu/corekids>)

MGRRE, MGS and CoreKids

- WMU – home to the Michigan Geological Survey (MGS), and the Michigan Geological Repository for Research and Education (MGRRE)
- CoreKids – outreach arm of MGRRE since 2007 and for the MGS since 2012
- 20-50 events per year, 10,000-20,000 contacts per year
- Mix of hands-on activities and presentations from themed modules
- Grant-funded
- Most events – focused towards 4th, 6th, and 8th grades – due to prior Earth Science Teaching Standards
- Allied Partner Events – Gem and Mineral Shows, Career Exploration Fairs, Science Fairs

The Lloyd Schmaltz Geology Museum



Lloyd Schmaltz (Dept. Chair – 1959-1988) and Dr. Julie Stein (Director, Washington Natural History Museum and WMU Graduate)

Augmented Reality Sandbox

- Portable – take to classrooms, external events





Students hold fossil shark jaw and learn about the biology of modern sharks

Students learn through a combination of presentations and guided tours featuring

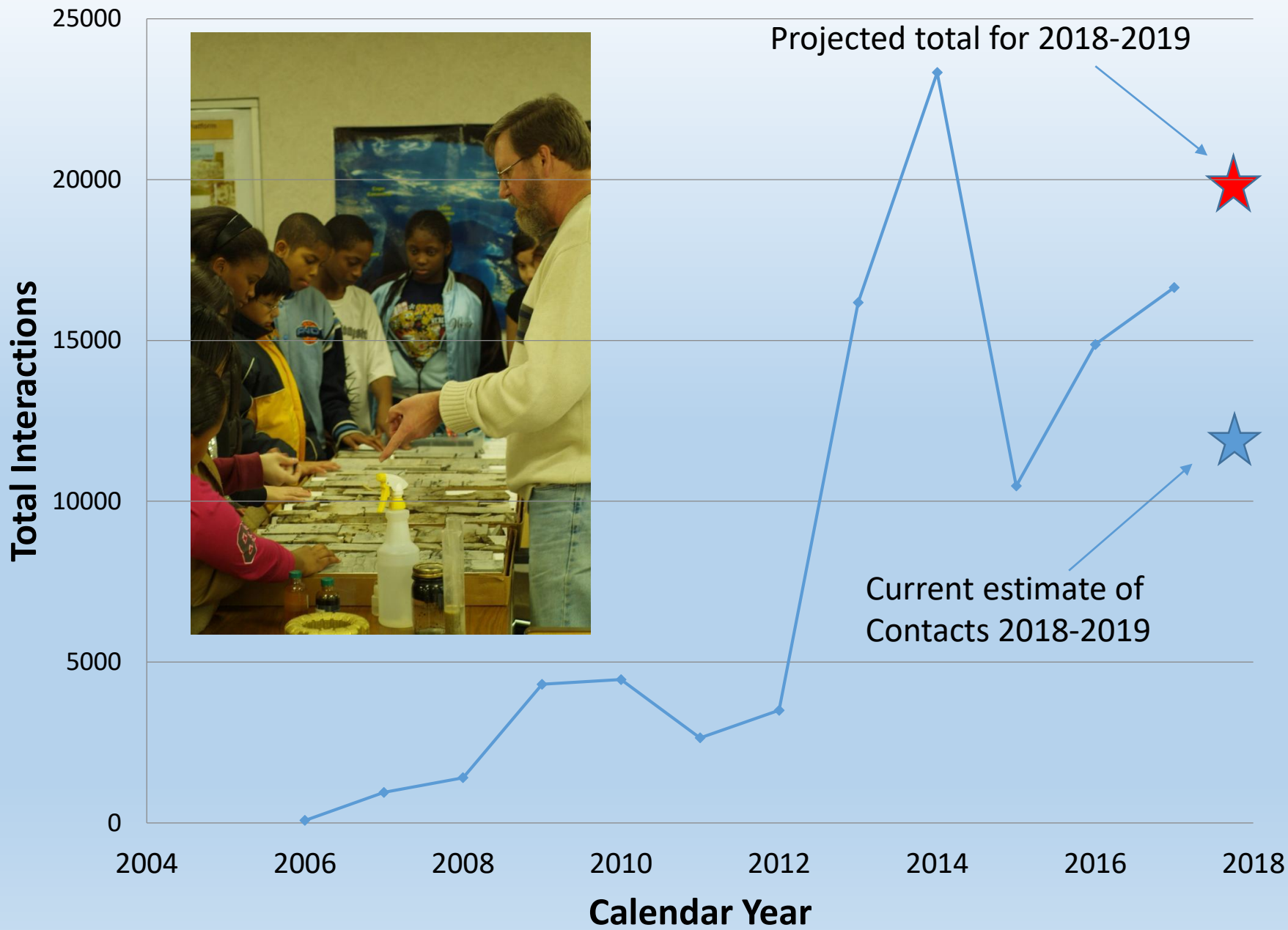
1. Samples for hands-on examination and
2. Interactive activities

CoreKids--Inviting students to personally engage with earth resources—learning and playing!

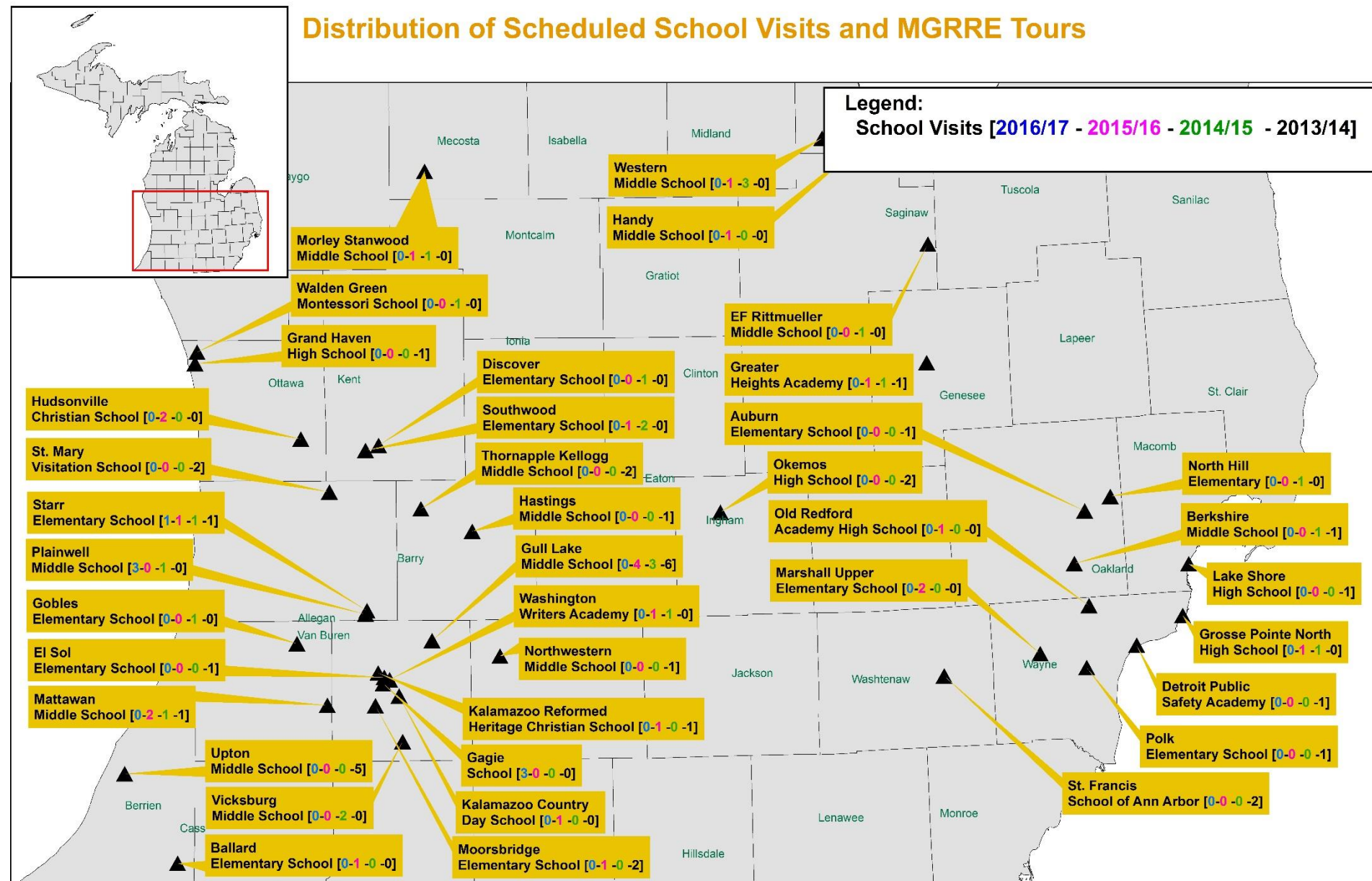
Module	Recommended Grade Level	Michigan Department of Education Standards	Description
Michigan Geologic History	2-12	E.ES.03.41, E.ES.03.32, E.ST.04.31, E.SE.06.12, E.ST.06.42, E4.p3A	Discussion of Michigan's Geologic resources in their historical geology context. Emphasis on resources such as Oil and Gas, and Groundwater
Hydrogeology	7-12	E.ES.07.81, E4.1A, E4.1C	Discussion of infiltration rates, porosity and permeability.
Natural Hazards: Earthquakes	6-12	E.SE.06.51, E.SE.06.52, E.SE.06.53, E3.4A, E3.4C, E3.4f	Emphasis is on vibrational energy of earthquakes and its impact on structures.
Natural Hazards: Volcanoes	4-12	E.SE.06.52, E3.1d, E3.4C, E3.4d, E3.4e, E5.4B	Flow rates and magma chemistry are used to classify different types of volcanic eruptions. Volcanoes as natural hazards are explored.
Natural Hazards: Impacts and Asteroids	2-12	E5.p1A, E5.3C, E5.4B, P3.6A, P3.6B	Describes the influence of asteroids on Earth's geologic history.
Shale Energy and Hydraulic Fracturing	7-12	E.ES.03.41, E.ES.03.32, E2.2B, E2.4A, E2.4B, E3.1c, E4.1C	Discussion of conventional vs. unconventional hydrocarbon reservoirs. Explains the process by which hydraulic fracturing occurs.
Michigan Fossils	2-12	E.ST.04.31, E.ST.06.31, E.ST.04.32, E.St.06.42, Ef.3D, E5.4f	Michigan fossils are used to explore Michigan's changing climate as a function of plate tectonics through geologic time. Fossils are used to explore basic ecological principles (food webs, competition, niches).
The Environment and Climate Change	2-12	E.ES.03.52, E.ES.07.41, E1.2B, E1.2f, E1.2g, E2.3A, E2.3d, E2.4B, E5.4A, E5.4e	Module presents an overview of the nature of carbon dioxide gas and the greenhouse effect. The albedo effect is used illustrate the impact of changes in land cover and land use.



Modules – mix of hands-on activities, presentations, display samples. Keyed to grade level and State Science Standards (NGSS)

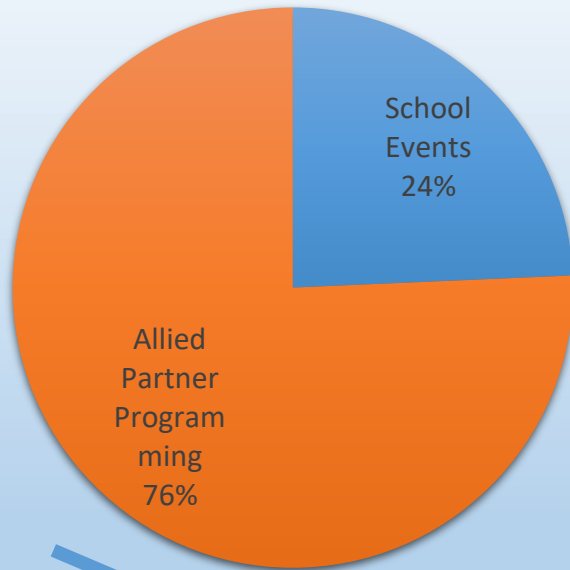


Distribution of Scheduled School Visits and MGRRE Tours



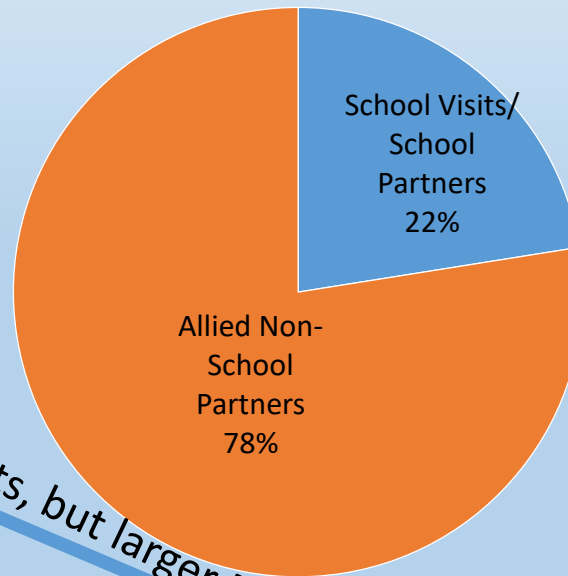
Be Selective – Even though we are the home of the Geological Survey of Michigan, we cannot be everywhere in the state. Parts of the UP are 10-12 hours drive 1-way from Kalamazoo! We limited our geographic footprint due to funds, travel liabilities, and student fatigue.

2013-2014 School Year

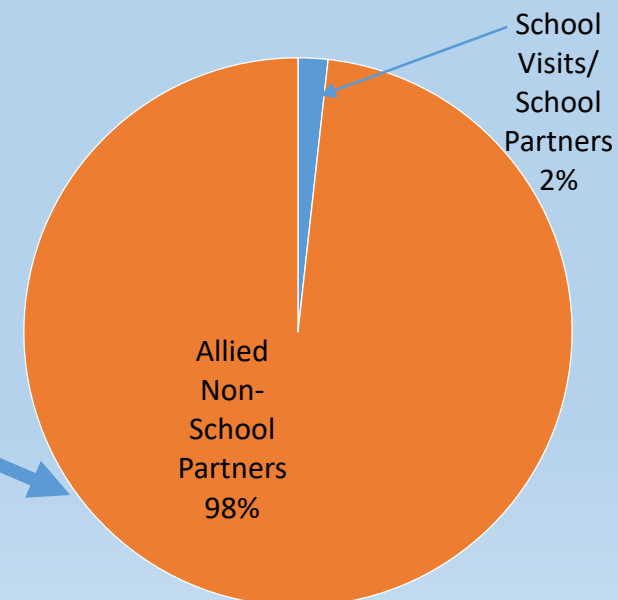


Individual school visits are very meaningful to both teachers and students. However, they are more costly due to travel and student stipends, and they result in fewer contacts per event.

2015-2016 School Year



2016-2017 School Year



Fewer Events, but larger Events

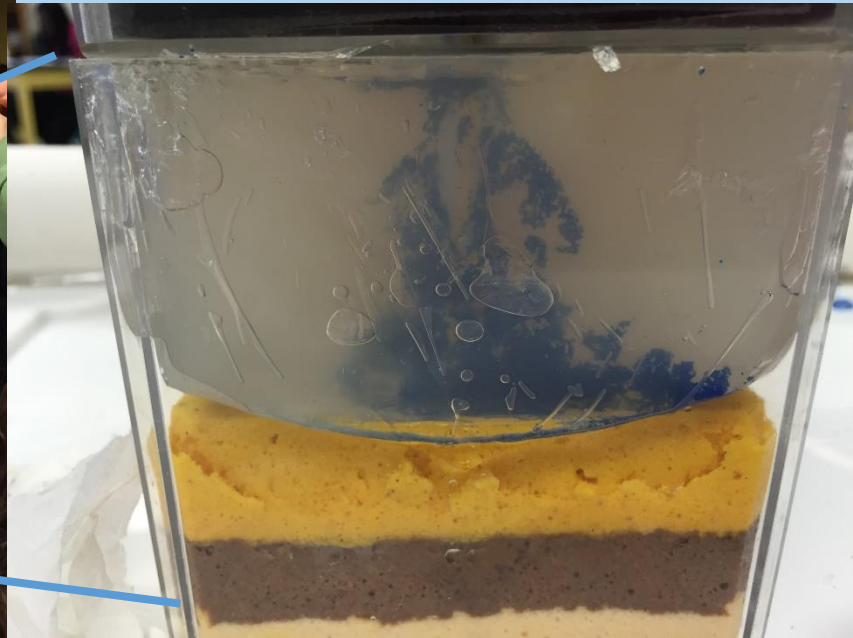
With Budget limitations – have had to focus on allied partner programming for contacts

- Provide Content – booths, volunteers, activities
- Allies provide promotional materials, access to location, and networks of attendees (often lead to other events)



Using our hydraulic fracturing model—
Student injecting fluid
into wells

Fun, hands-on activities are keys
that lead to valuable insights into
geologic principles, phenomena and
related activities



Some of Our Educators have gone on to Teaching Positions, State Regulatory Agencies, and Industry. All of them still engage in outreach at their new positions!



Our Student Educators gain valuable experience:

- Communicating our science
- Interacting with the public

They hone their public speaking skills





CoreKids Booth at 2014 MSTA Meeting



2018 – NSF sponsored Workshop – Bridging the Gap between Chemistry and Geology

A Strong Outreach Program not only focuses on the Students, but also on the Teachers

- Develop Partnerships with local Science Teachers Associations
- Give a Presentation or have an Exhibit at Teacher Association Conferences
- Provide training opportunities – Teacher workshops
- Provide assistance in finding teaching samples, geologic information, field trip prep.
- Host a Teachers Association Meeting – MESTA 2011 Annual Meeting at Kalamazoo



Lessons Learned from 12 Years of Community Outreach and Engagement

- **Build networks** – CoreKids works with a variety of partners
 - Financial support – donors
 - Provide venues and joint event opportunities
 - Communication with members (Teaching Associations) – identify new events/partners
- **Engage with the community**
 - Student educators – become role models to children
- **Future Geoscientists**
 - Spark interest in K-12 students – may pursue careers
 - Valuable training for College students – public speaking, communicating science, working with children and the general public
- **Engage with Teachers**
 - Broadens the impact of the program – teachers take home new ideas and activities to use with their own students
 - Use your State's Science Standards – Allows Teachers to fit your visit or materials to their syllabus

Acknowledgements

- Over the past 12 years, the CoreKids Program has benefited from a vast network of supporters. We thank our donors and sponsors, our partner organizations, our Michigan K-13 teachers, and the huge number of WMU Undergraduate and Graduate Students who volunteered at our events (~50 different students!).
- Special Thanks go to the following Student Educators who developed new modules, resources, and activities or volunteered at many events:

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