A report from the MSU Science Math Resource Center

Diversity, Equity and Inclusion in MSU Youth STEM Outreach

The framework presented here highlights exemplary practices for diversity, equity and inclusion (DEI) in science, technology, engineering and mathematics (STEM) outreach programs for youth in university programs hosted in an informal/out-of-school-time setting. Outlined in the framework are four primary domains:

(a) organization fundamentals
(b) recruitment and registration
(c) outreach program personnel, and
(d) outreach program design.

For each topic within these domains, guiding questions and exemplary practices for DEI are presented. This framework is designed to allow those who host university STEM outreach programs for youth to evaluate and modify their practices to improve DEI. Section 2 calls specific attention to challenges faced by youth who have been historically under-served or under-represented in STEM.

The framework was developed through the analysis of both primary and secondary sources, including:

- Interviews with professionals from the MSU Office of Diversity & Inclusion and College of Education, Health and Human Development; Montana GEAR UP; and Montana Office of Public Instruction
- Interviews with K-12 educators and students
- Survey of Montana Science Olympiad coaches
- Community of practice meeting with MSU STEM outreach professionals and advocates
- Numerous MSU and national resources (see Appendices A and B) including Montana State University's Diversity and Inclusion Framework and the College of Education, Health & Human Development's Diversity and Inclusion Plan

This effort was also supported by SMRC's national partners, including Science Olympiad; National Science Foundation EPSCoR; NASA SciAct, NASA Astrobiology Institute and GLOBE; and the National Girls Collaborative Project as well as the Science Math Resource Center advisory board.

Funding was provided by the Dean's Office of the College of Education, Health & Human Development.

Please note that our findings and recommendations are not exhaustive and may change over time as new knowledge is acquired.

For comments or questions on this publication, please contact the Science Math Resource Center at Montana State University at smrc@montana.edu

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Date of self-audit: _____

Team members participating: _____

Organization Fundamentals	Guiding Questions	Exemplary Practices
Organization/ Staff	❒ Does the organization's mission/vision include a commitment to diversity, equity, and inclusion? ❒ Does the organization participate in campus-wide DEI assessments and efforts? ❒ Does the organization provide transparent plans and data on diversity-related demographics and outcomes? ❒ Does your team itself reflect the diversity of the populations you seek to serve? ❒ Have staff undertaken implicit bias training? ❒ Do you consistently review your practices and programs? ❒ Do staff have a way to report or intervene in an appropriate manner if they observe behaviors that show cultural insensitivity, racial biases or prejudice?	• Review current team composition, mission/vision, and team training • Participate in departmental-, college- and university-level DEI activities • Share diversity-related demographics and outcomes with department, college, and university (being cautious of student privacy) • Institute policies for identifying, reporting, and intervening in inappropriate or confusing situations
Media/ Promotions	❒ Do web pages and other promotional materials include a statement of welcome to students of all identities? ❒ Does imagery in promotional materials, signage, videos, social media, web pages, etc. depict students of all identities? ❒ Are all web pages and other resources accessible for people with disabilities? Is translation support available for non-native English speakers? ❒ Do physical spaces showcase inclusive design and décor with representations of diverse identities and ways of being? ❒ Are we making visible the achievements of youth from under-represented groups?	• Audit current digital and physical spaces for imagery and text; update as needed • Use MSU Content Management System and accessibility checker for web pages; do not send content only as a PDF file • Create a plan for how to assist non-native English speakers. Pay special attention to forms/PDFs for which online translation may be unavailable. • Create a plan for highlighting youth achievements

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Recruitment Protocol	Guiding Questions	Exemplary Practices
Population	❒ Are we recruiting students of all backgrounds and identities? ❒ Might we be able to recruit students regardless of past academic achievement? ❒ Are our recruitment efforts reaching rural, reservation, and one-room schools or other populations that have been historically excluded from STEM?	• Gather current baseline data so progress can be measured • If possible, allow all interested students to participate • Ensure that recruitment is focused on reaching a diverse community of participants with a special emphasis on underrepresented and/or marginalized populations
Practices	❒ Are we advertising in a way that is clear, available and accessible to all schools and teachers? ❒ Are we recruiting in a way that is inviting to all students? ❒ Are we considering how we can recruit schools/students who do not regularly participate in our outreach programs? ❒ Can we consider "cluster recruiting" – inviting students as teams, groups, or pairs rather than individuals?	• Contact schools/teachers/families via multiple relevant avenues (e.g., newsletters, teacher groups) • Create promotional videos to alleviate fear of the unknown; include past participants from under-represented groups • Recruit beyond those with pre-existing interest in STEM • Develop and maintain community partnerships and family engagement – use liaisons located within the community, such as GEAR UP representatives • If possible, don't single out students—youth from historically excluded populations may feel more comfortable when with a friend or schoolmate

Registration and Other Forms	Guiding Questions	Exemplary Practices
Inclusivity	❒ Are all forms and evaluations inclusive of all students? (e.g., more than two gender options)	• Use open-ended response items on all forms and/or include multiple response options on form items
Accommodations	❒ Do registration forms request information regarding accommodations for participants with disabilities? ❒ Do participants know how to access additional university resources if needed?	• Solicit information about necessary accommodations in order to properly prepare for the outreach event and suggest a deadline that will allow organizers ample time to prepare • Share information about university resources on registration forms and promotional materials

Notes

Outreach program personnel	Guiding Questions	Exemplary Practices
Program Staff	❒ Are the outreach organizers prepared to participate with cultural humility? (*Cultural humility is "a lifelong process of self-reflection and self-critique whereby the individual not only learns about another's culture, but one starts with an examination of her/his own beliefs and cultural identities."*[1])	• Understand the culture of potential participants • Collaborate with cultural and/or Indigenous experts during the program design process • Staff should take part in ongoing training and discussion
Instructors, Guest Speakers, Presenters, Volunteers	❒ Do the instructors, speakers, and volunteers represent the population of students being recruited/served? ❒ Have all instructors, guest speakers and volunteers been made aware of your organization's commitment to diversity, equity, and inclusion? ❒ Have all received DEI-related training? ❒ Do volunteers have a way to report or intervene in an appropriate manner if they observe behaviors that show cultural insensitivity, racial biases or prejudice?	• Whenever possible, include program leaders, instructors and guest speakers of all backgrounds • Reach out to campus affinity groups for volunteers, recruiters and mentors (e.g., American Indian Club, oSTEM (Out in Science, Technology, Engineering and Mathematics) • Include commitment to DEI and exemplary practices in volunteer recruitment, orientation and training • Create or share institutional resources for reporting inappropriate behaviors; instruct volunteers on how to safely report ,and reinforce that such reporting is appreciated, safe and respected

Notes

1Definition credited to Melanie Tervalon and Jann Murray-García, Journal of Health Care for the Poor and Underserved. Volume 9, Number 2, May 1998, pp. 117-125 (Article) Published by Johns Hopkins University Press. https://muse.jhu.edu/article/268076/pdf

Outreach program design	Guiding Questions	Exemplary Practices
Physical Location	❒ What physical location would allow students of all backgrounds and identities to attend the outreach program? ❒ Would a virtual attendance option alleviate financial burdens and/or increase participation? If so, do students have access to necessary technology? ❒ How can we make the physical location more welcoming to students of all backgrounds and identities?	• Offer outreach events away from MSU's main campus: rural communities, reservations, Family-Graduate Housing, schools or sites easily accessible to schools • Offer virtual attendance if possible • If at MSU, provide a campus map, signage with directions, etc. • Provide a land acknowledgment at opening ceremonies—include not just the acknowledgment but share knowledge, as well
Time/Duration	❒ What time of year would allow students of all identities to participate in the outreach event? ❒ What time duration would be most beneficial to students of all identities? ❒ Does the duration of the event accommodate students with disabilities?	• If possible, offer long-term, summer outreach programs • Offer recurring outreach programs • Recognize students who have participated in multiple university programs • Provide ample transition time to support students with disabilities
Instructional Format	❒ Does the outreach program format meet the needs of students of all identities? ❒ What type of learning does the outreach program format encourage?	• Utilize project-based learning in program activities • Integrate technology appropriately • Practice culturally responsive instructional strategies • Give students the opportunity to replicate inquiry practices used by STEM professionals • Use multiple pathways for diverse learners
Content	❒ Is the content relevant to students of all identities? ❒ Is the content both challenging and accessible to students of all identities? ❒ Has content—including external books, films, etc.—been reviewed for bias? ❒ Do presentations and instructional materials include imagery that represents people of all backgrounds? ❒ Do you intentionally involve diverse learners in program design? In user testing?	• Utilize contexts that are relatable and/or important to students of all backgrounds and identities • Connect content to college and career STEM opportunities • Maintain equitable STEM content standards

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Outreach program design (cont.)	Guiding Questions	Exemplary Practices
Accommodations	❒ What accommodations are being made for people with disabilities, including student participants, volunteers, instructors, etc.?	• Put in place a process to gather accommodation requests • Identify someone responsible for overseeing accommodation requests • Build a team of volunteers to help deliver special assistance when needed • Accommodate requests as needed (including but not limited to closed captioning on videos, materials in multiple languages, sign language interpretation, designated seating, etc.)
Atmosphere	❒ Is the atmosphere welcoming to and enjoyable for students of all backgrounds and identities? ❒ How does the outreach program promote the development of relationships with and among students? ❒ Is inclusive language used?	• Encourage innovation • Encourage (but do not force) collaboration • Encourage students to voice their ideas and opinions • Practice and encourage active listening • Encourage productive struggle • Use gender-neutral pronouns when possible (e.g., do not refer to all scientists as he/him)
Resources	❒ Are students' basic needs being met? ❒ Are we connecting with / publicizing other university resources that are available to students?	• Provide food, snack, drinks, etc. • Provide access to relevant resources (e.g., TRiO, relevant offices or student centers) • Provide a physical or virtual student support room
Program debrief	❒ Do post-program reviews include an assessment of DEI practices? ❒ Is program evaluation data related to DEI used for future program design?	• Always do a post-program debrief • Use tools to carefully audit whether exemplary practices for DEI were followed • Use program evaluation data to improve future programs • When appropriate, share observations and findings with others

Notes

Including more Under-served/Under-represented students in youth STEM outreach

Montana has the highest percentage of rural schools in the U.S. (74.0%) and the highest percentage of rural school districts (95.3%). Montana is also home to seven reservations and 12 tribal nations. Native Americans are Montana's largest minority group with approximately 7% of Montana citizens identifying as Native American (Approximately 14% of school-age students are Native American). 5.2% of Montanans do not speak English, and about 10% of households experience food insecurity. These percentages are not always reflected in participation rates for MSU youth STEM outreach programs.

To further explore some of the unique challenges to including more under-served/under-represented (US/UR) students in MSU youth STEM outreach, we surveyed Science Olympiad coaches from across the state including many rural schools; interviewed educators representing four tribal areas of Montana: Blackfeet, Crow, Rocky Boy, and Fort Peck; and consulted with the Office of Public Instruction's Indian Education for All and the Montana GEAR UP office based at Montana State University.

Because our goal is to overcome barriers—some current, some historical—this report focuses on *challenges* that we can study and address in order to reach out to more US/UR students. We recognize that this type of approach by necessity highlights *deficits*, when in fact, a different type of report could take an *asset-based approach* and highlight the many unique strengths, talents and worldviews that all students can contribute to a program.

We acknowledge that many populations—particularly Native Americans in Montana—have been historically and systemically excluded from STEM and other academic extra-curricular activities—a barrier that requires much more effort to overcome.

Interviewees noted the following factors as barriers to participation in university-hosted youth STEM outreach programs:

Potential Community-Level Barriers:

- Prevalence of low-income homes
- Students in transience (e.g., a child lives with one family member part-time and another part-time; they may be located in different school districts)
- Trauma, which can take many forms, including suicide; domestic or community violence; abuse; illness/injury; and many other stressors.
- Drug use (by student or guardian/family member)
- Family members who do not prioritize academics
- Low level of parent engagement

Potential School-Level Barriers:

- Challenges in filling teaching positions
- Limited offerings of STEM courses and extracurricular STEM activities (computer science club, Science Olympiad team, etc.)
- Long travel to STEM outreach opportunities
- Lack of funding for transportation, lodging and STEM materials

Potential Teacher-Level Barriers:

- High teacher turnover
- Teachers who live outside the community and are less involved in local events and groups
- Lack of support for extracurricular STEM coaches

Potential Student-Level Barriers

- Low achievement scores
- Limited knowledge of the research process or exposure to STEM careers
- Lack of self-esteem and confidence
- Lack of celebration for academic achievements
- Aversion to head-to-head competitive activities

Our interviewees recommend the following potential solutions that could increase support for and inclusion of more US/UR students in MSU youth STEM outreach programs:

- Communicate frequently and consistently with community leaders, school administrators, teachers/coaches and students in order to identify barriers and discuss potential solutions
- Consider supporting local "ambassadors"
- Promote and facilitate family engagement
- Offer funding for transportation, lodging, materials and teacher/coach stipends
- Provide professional development for STEM teachers
- Recruit students regardless of past academic achievement; consider reaching out to students who will not automatically consider college

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Including More US/UR Students in Youth STEM Outreach (cont.)

- Recruit students in pairs, teams or groups rather than a single individual
- Foster an environment that promotes self-esteem and confidence
- Provide opportunities for students to engage in research practices used by STEM professionals—connect activities to potential future careers
- Celebrate the achievements of US/UR students and STEM professionals
- Take away the fear of the unknown; create a video to show what the university event or program will be like; encourage past participants to share their experiences and recruit others from their communities
- Enlist support from MSU groups such as EMPower, TRiO, Office of International Programs, Center for Bilingual and Multicultural Education, Center for Research on Rural Education, the Department of Native American Studies, etc.

Appendix A – MSU Statement on Diversity

Montana State University is committed to creating a culture of intellectual and personal growth. Because learning is enhanced when topics are examined from diverse perspectives and because individuals possess unique outlooks which reflect the world around us, Montana State University is dedicated to creating an inclusive community that embraces a rich mix in the composition of its student body, staff and faculty. The distinction in viewpoints that comes from differences in race, gender, age, language, socioeconomic status, religion, political affiliation and geographical background are appreciated and valued at MSU as important aspects of the campus community at every level and in every sector of the campus.

To this end, MSU welcomes international students and faculty and enthusiastically seeks engagement with peers from around the globe to expand our depth of understanding and share in the discovery of knowledge. MSU has an especially strong commitment to Native Peoples and actively engages in the development of social and educational initiatives to preserve the cultural integrity of all American Indian students, faculty and staff. MSU strives to advance the ideals of human worth and dignity for all by facilitating open discussion, supporting rational resolution of conflict and encouraging on-going examination of values.

www.montana.edu/president/communications/diversity.html

Appendix B – References

- *American Dental Education Association – Checklist to Promote DEI.* www.adea.org/uploadedFiles/ADEA/Content_Conversion_Final/publications/2020-ADEA-Diversity-Equity-and-Inclusion-Checklist.pdf
- *Harvard University Office of Regulatory Affairs & Research Compliance – Inclusive Demographic Data Collection.* https://cdn1.sph.harvard.edu/wp-content/uploads/sites/2102/2020/04/ORARC-Tip-Sheet-Inclusive-Demographic-Data-Collection.pdf
- *National Alliance for Partnerships in Equity Education Foundation – STEM Equity Program Evaluation Rubric.* https://napequity.org/wp-content/uploads/Effective-Practices-and-Scaling-Workgroup-Program-Evaluation-Rubric-Final_9-14-19_ml-1.pdf
- *National Educational Association of Disabled Students – Making Extracurricular Activities Inclusive.* www.neads.ca/en/about/projects/inclusion/guide/
- *National Girls Collaborative Project – Checklist for Accessible Meetings and Conferences.* (Available as a document by request: smrc@montana.edu)
- *New York University Education Justice Research and Organizing Collaborative – Culturally Responsive Curriculum Scorecards.* https://steinhardt.nyu.edu/metrocenter/ejroc/culturally-responsive-curriculum-scorecards
- *Partnerships in Education and Resilience – Dimensions of Success Observation Tool.* www.pearinc.org/dos-observation-tool
- *SciGirls – How to Engage Girls in STEM.* www.scigirlsconnect.org/wp-content/uploads/2019/06/SciGirls-Strategies-Guide.pdf
- *University of Washington Center for Evaluation & Research for STEM Equity – Critical Evaluation Questioning Guide.* https://depts.washington.edu/cerse/wordpress/wp-content/uploads/2020/10/Critical-Evaluation-Questioning-Guide-.pdf

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Acknowledgment: This report is not comprehensive, and these suggestions are meant to guide and encourage further conversations on which students are or are not participating in MSU's youth STEM outreach programs—and why. Solutions and practices change over time and will never be one-size-fits-all. We encourage continuous dialogue, exploration and training for staff. For information about this project, please contact the MSU Science Math Resource Center: smrc@montana.edu

The Science Math Resource Center is a STEM outreach center located in the Department of Education at Montana State University. The Center provides professional development to STEM educators in formal and out-of-school settings and STEM programming opportunities for youth of all ages. SMRC is home to the Montana Science Olympiad and works with organizations across the state to advance STEM access and equity.