



Fostering STEM Diversity

Broadening Participation in
Science, Technology,
Engineering, and Mathematics
(STEM) Courses and Careers

OPAS Vision for the Year 2020 - All Oregonians have the opportunity to choose and successfully pursue engineering or applied science as their field of study and career, thereby helping Oregon's industries innovate and prosper in the global economy.



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Succeed Workgroup Focus: To
increase the enrollment and
successful completion of STEM
courses by individuals from groups
underrepresented in STEM careers

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“Broadening opportunities and enabling the participation of all citizens - women and men, underrepresented minorities, and persons with disabilities - is essential to the health and vitality of science and engineering.”

- (2004 Guide to Programs, NSF Funding Opportunities)

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Participation of All Citizens Benefits Society in Two Ways

- Diverse, competitive, and engaged STEM workforce
- Well-prepared citizens

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Issues around Diversification of the STEM Workforce

- Familial, cultural, and social capital
- Availability of resources
- Access to higher education
- Academic achievement
- Educational attainment

- (2000 Report of National Postsecondary Education Cooperative, National Center for Education Statistics)

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Major Barriers to the Participation of Females and Underrepresented Minorities in STEM Courses and Careers

- Attitudes and perceptions
- Performance levels
- Extracurricular activities and course participation
- Career information

- (*Breaking the Barriers: helping female and minority students succeed in mathematics and science.*)

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Effective Efforts in STEM Diversity

- Provide learning opportunities for teachers, students, and families
- Operate with a specific focus on sparking interest of underrepresented students
- Support family participation
- Build in opportunities for on-going engagement
- Offer meaningful learning to connect to the lives of participants

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Effective Strategies to Increase Diversity in STEM

- High quality instruction
- Strong academic components
- Relationships with key adult(s)
- Supportive programs across the P-20 system

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Effective Strategies to Increase Diversity in STEM

- Meaningful involvement of families
- Timely access to critical information for families
- Attention to cultural backgrounds of students
- Supportive peer group

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Effective Strategies to Increase Diversity in STEM

- Environments that expect, demand, and nurture success
- Financial assistance
- Comprehensive programming
- Build confidence and skills; validate aspirations

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Engaging Citizens from Diverse Backgrounds

- Focus on building trusting, collaborative relationships
- Recognize, respect, and address families' needs and cultural differences
- Embrace partnerships where power and responsibility are shared

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Challenges to Engaging Citizens from Diverse Backgrounds

- Bad first impressions
- Poor communication skills and/or strategies
- Past experiences
- Individuals' lack of confidence
- Differing expectations
- Lack of confidence in educational and political systems

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Strategies for Engaging All Families (1)

- Collaborate on ways to be involved
- Provide opportunities to develop participation skills
- Express high expectations for the partnership(s)
- Communicate in person
- Recognize diverse family structures

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Strategies for Engaging All Families (2)

- Make events accessible to families
- Lower language barriers
- Facilitate connections
- Promote meaningful involvement
- Look for ways to incorporate families' funds of knowledge

(- Building Trust with Schools and Diverse Families)

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Key Considerations in Broadening Participation in STEM

- ✓ Early intervention is key.
- ✓ Skills development or enhancement is critical.
- ✓ Fostering extracurricular engagement is crucial.
- ✓ Family involvement is essential.
- ✓ Meaningful connections to everyday lives are imperative.

- (Breaking Barriers: helping female and minority students succeed in mathematics and science)

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To Support STEM Diversity, Colleges and Universities could . . .

- Examine admissions practices and policies for bias
- Provide support systems for enrolled students
- Practice collaborative teaching and learning
- Engage faculty and students in research on STEM education and diversity issues

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To Support STEM Diversity, Colleges and Universities could . . .

- Create K-12 outreach connections
- Encourage faculty and students to volunteer in classrooms or at K-12 events
- Offer scholarships to diverse students

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To Support STEM Diversity, Businesses and Industries could . . .

- Provide career outreach as an organization in at community events, at fairs and other events programs, and through local papers
- Empower employees as individual volunteers at events and programs , as mentors in classrooms and informal settings
- Support stable funding for education
- Offer internships for students and teachers

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To Support STEM Diversity, Communities could . . .

- Create a setting of civility and acceptance -is it safe, kind, respectful, productive?
- Support extracurricular and enrichment activities in and outside of schools
- Volunteer to support youth learning
- Promote social justice
- Support stable funding for education

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To Support STEM Diversity, Volunteers could . . .

- Form ongoing relationships with schools, teachers, and students
- Access and utilize supports and resources
- Finds a venue that encourages their personal engagement and stick with it
- Recruit others to volunteers

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To Support STEM Diversity, Schools could . . .

- Embed engineering, college planning, and career awareness in the curriculum
- Offer field trips to college campuses and business and industry sites
- Expect that all students will pursue education beyond the high school diploma

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To Support STEM Diversity, Schools could . . .

- Provide students with necessary support mechanisms to ensure transition into post-secondary education
- Encourage family involvement through a variety of opportunities and venues
- Foster ongoing relationships with students, families, volunteers, and businesses

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To Support STEM Diversity, Schools could . . .

- Support a wide variety of extracurricular activities
- Practice collaborative styles of teaching and learning and address multiple intelligences
- Reflect on daily practices to check for bias

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To Support STEM Diversity, Classroom Teachers could . . .

- Examine daily practice, demeanor, and materials for bias and work to eliminate any occurrences
- Encourage active learning
- Help students to see science, math, and engineering in their everyday lives
- Teach extracurricular STEM activities

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To Support STEM Diversity, Classroom Teachers could . . .

- Assign student work that requires collaboration with family members
- Serve as role model of lifelong learning through of both STEM content and processes
- Invite the participation of families into the classroom as volunteers and trip chaperones

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To Support STEM Diversity, Classroom Teachers could . . .

- Foster students' views of themselves as STEM professionals during class activities
- Encourage diverse student involvement in extracurricular STEM activities
- Embed engineering, college planning, and career awareness in the curriculum

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To Support STEM Diversity, Families could . . .

- Maintain and communicate high expectations
- Foster positive risk-taking and learning through failure
- Ask counselors, local organizations, and others for help with college planning and career awareness
- Visit college campuses

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To Support STEM Diversity, Families could . . .

- Talk to children and youth about what they're learning in science and math classes
- Explore STEM learning as a family
- Learn about education and career opportunities
- Help children and youth explore their interests and identify skills and talents
- Foster life skills - time management, problem-solving, resilience, discussion

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To Support STEM Diversity, Families could . . .

- Be examples of learning new things and expanding boundaries
- Talk with children and youth about how you use math and science in daily life

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To achieve greater STEM diversity, K-12 schools, institutions of higher education, community organizations, businesses and industries, state and federal agencies, private foundations, and individuals have perspectives, resources, and expertise that must be included in the collaborative solution.

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References

- (1) *2004 Guide to Programs, NSF Funding Opportunities*
- (2) *2000 Report of National Postsecondary Education Cooperative, National Center for Education Statistics*
- (3) *Breaking the barriers: helping female and minority students succeed in mathematics and science*, Clewell et al, 1992
- (4) *2000 Report of National Postsecondary Education Cooperative, National Center for Education Statistics*
- (5) *Building Trust with Schools and Diverse Families*, Northwest Regional Education Laboratory

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