

STEM Education National Goals and Metrics

K-12 Education

Goal 1 – Student Learning: Prepare all students with the science, technology, engineering, and math skills needed to succeed in the 21st-century technological economy, whether in postsecondary education or the workforce; and graduate students with the capability and motivation to become STEM professionals, educators, and leaders.

National Metrics:

1. NAEP Long-term Trend Mathematics scores for 9, 13, and 17 year olds
2. NAEP National Mathematics and Science data for grades 4, 8, and 12 – percent of students at or above proficient
3. Percentage of students scoring at proficient or advanced levels on state mathematics and science assessments
4. SAT math and ACT math and science scores; SAT subject tests
5. Number of AP exams with scores of 3, 4, or 5 in particular subjects; number of students taking AP exams
6. Trends in International Mathematics and Science Study (TIMSS) scores and ranking
7. Program for International Student Assessment (PISA) scores and U.S. ranking
8. Percentage of college students who took remedial or developmental courses in math during their freshman or sophomore years

Goal 2 – Teacher Quality: Recruit and retain teachers with majors or minors in STEM fields and increase the content knowledge of current K-12 STEM teachers.

National Metrics:

1. Percentage of middle and secondary school students whose math and science classes are taught by teachers with (a) a major and (b) a minor in the subject being taught
2. Percentage of math and science teachers who are highly qualified under No Child Left Behind
3. Average number of years of teaching experience for math and science teachers
4. Percentage of math and science teachers with a master's degree or higher in their primary teaching field
5. Percentage of math and science teachers who meet criteria for being “effective” teachers

Goal 3 – Engagement: Increase student engagement in STEM and their perception of its value to their lives.

National Metrics:

1. Average number of Carnegie units earned by high school students in math and science

2. Number of students who major in STEM fields in college
3. Percentage of eight-graders taking algebra
4. Percentage of students who express an interest in math and science
5. Percentage of students participating in extracurricular activities in math and science

Undergraduate Education

Goal 1 – STEM Workforce: Increase the number of undergraduates who enroll in and complete STEM degree programs, and are thus prepared to enter STEM or STEM-related careers or advanced education.

National Metrics:

1. The number and/or percentage of students who declare and complete a STEM major or program of study
2. The number and/or percentage of STEM graduates who stay in STEM by attending a STEM or STEM-related graduate program
3. The number and/or percentage of STEM graduates who take a job in a STEM or STEM-related field
4. Employer satisfaction with student preparation and readiness to enter the STEM job market
5. Student achievement on national STEM exams, standardized tests within disciplines, and licensure exams

Graduate and Postgraduate Education¹

National Metrics:

1. The number and/or percentage of graduate/postdoctoral fellowship or traineeship recipients who complete a STEM graduate or postdoctoral program; the number and/or percentage of program completers who are employed in a STEM or STEM-related field
2. Average time to degree completion for STEM doctoral students
3. Average age at which graduate and/or postdoctoral fellows established an independent scientific career
4. Contributions to the research enterprise

¹ The ACC did not establish any goals for Graduate and Postgraduate Education; however, it did establish metrics. From the ACC report: “The ACC discussed at length the goals served by graduate and postgraduate traineeship and fellowship programs. Although the ACC recognized that the focus of graduate and postdoctoral training is on producing novel research results, the development of research-related goals for these programs was beyond the scope of the ACC. However, it was well recognized that graduate and postdoctoral programs do have clear education and training outcomes, the success of which should be measured using a series of metrics such as the percentage of fellowship recipients who complete their degree program, the time to degree completion, or the age at which the student establishes an independent career.”

Informal Education and Outreach

Goal 1 – Public Audiences: Increase awareness, interest, engagement, and understanding of STEM concepts, processes, and careers by the general public and other targeted populations in the context of informal education and outreach.

National Metrics:

1. Awareness, knowledge, or understanding of STEM concepts, processes, or careers via informal STEM education and outreach deliverable
2. Engagement or interest in STEM concepts, processes, or careers via informal STEM education and outreach deliverable
3. Attitude towards STEM-related topic or capabilities via informal STEM education and outreach deliverable
4. Behavior in target audience resulting from engagement with informal STEM education and outreach deliverable
5. New skills in target audience based on engagement with informal STEM education and outreach deliverable

Goal 2 – Professional Audiences: Improve practice and build professional and institutional capacity through efforts that seek to generate, develop, and apply effective ideas and models for the informal STEM education field.

National Metrics:

1. Awareness, knowledge, or understanding of informal STEM education/outreach research or practice
2. Engagement or interest in advancing the informal stem education and outreach field
3. Attitude towards informal STEM education/outreach research or practice
4. Behavior in target audience related to informal STEM education/outreach research or practice
5. New skills in target audience based on informal STEM education/outreach research or practice

STEM Education Program Goals and Metrics

K-12 Education

Goal 1 – Student Learning: Prepare all students with the science, technology, engineering, and math skills needed to succeed in the 21st-century technological economy, whether in postsecondary education or the workforce; and graduate students with the capability and motivation to become STEM professionals, educators, and leaders.

Program Metrics:

1. Percentage of projects that demonstrate significant improvement in student achievement in a given subject, based on rigorous evaluation designs
2. Percentage of students who meet or exceed proficient and advanced levels on state assessments of a given subject
3. Percentage of basic research projects judged by independent experts to make a significant contribution to our understanding of student learning in a given subject
4. Percentage of funded projects that are using multi-site, controlled trials of interventions and programs to assess project effectiveness
5. The number of new approaches and interventions developed with program funds that have been found to be effective and that subsequently have been adopted at scale

Goal 2 – Teacher Quality: Recruit and retain teachers with majors or minors in STEM fields and increase the content knowledge of current K-12 STEM teachers.

Program Metrics:

1. Percentage of projects, based on rigorous evaluations, where the students of participating teachers demonstrate increased competency in a given subject or area
2. Percentage of teachers, based on rigorous evaluations, demonstrating increased competency in a given subject or area
3. Percentage of teachers, based on rigorous evaluations, who improve classroom instruction in a given subject or area
4. Percentage of participants who become teachers in high poverty schools
5. Percentage of participating teachers who are still teaching in five years

Goal 3 – Engagement: Increase student engagement in STEM and their perception of its value to their lives.

Program Metrics:

1. Percentage of students whose enjoyment of a given subject increased after participation in project activities
2. Number of math and science courses taken by participants in high school, compared to nonparticipants

3. Percentage of participants who major in STEM fields in college, compared to nonparticipants
4. Percent of participants who engage in sustained extracurricular activities, compared to nonparticipants

Undergraduate Education

Goal 1 – STEM Workforce: Increase the number of undergraduates who enroll in and complete STEM degree programs, and are thus prepared to enter STEM or STEM-related careers or advanced education.

Program Metrics:

1. The number and/or percentage of students who declare and complete a STEM major or program of study
2. The number and/or percentage of STEM graduates who stay in STEM by attending a STEM or STEM-related graduate program
3. The number and/or percentage of STEM graduates who take a job in a STEM or STEM-related field
4. The number and/or percentage of students who are not STEM majors, but who successfully complete STEM courses
5. Student scores on relevant licensure, national disciplinary exams, graduate/professional entrance exams and the like
6. Employer satisfaction with student preparation and readiness to enter the STEM job market

Goal 2 – Collaborative Communities: Encourage and support STEM professional collaborations, networks, communities and alliances among educators, students, practitioners, government, professional organizations, and industry.

Program Metrics:

1. The number and/or percentage of students who participate in scientific activities or research experiences in industry, government, or the nonprofit sector
2. The number and/or percentage of students who present research findings at scientific meetings or student science exchange events
3. The number of students who participate in interdisciplinary research or educational experiences
4. The number of students who earn minors in a second STEM field
5. The number of STEM courses successfully completed by non-STEM majors

Goal 3 – Institutional Capacity: Support advancement and development of STEM personnel, programs, and infrastructure in institutions that educate.

Program Metrics:

1. The number of students who engage in research experiences in an academic, industry, government, or nonprofit laboratory

2. Number of courses that integrate the use of instruments, methods, and procedures that are commonly used in an academic, industry, or government laboratory

Graduate and Postgraduate Education¹

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2. Average time to degree completion for STEM doctoral students
3. Career induction and retention in academia (independent funding, tenure), industry, government and in STEM or STEM-related fields
4. Career satisfaction – actual career pathway versus desired pathway
5. Research quality and productivity

Informal Education and Outreach

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