STEM EDUCATION

STEM (Science, Technology, Engineering and Mathematics) education in the United States is an essential component of economic growth.

Economists estimate that about half of the economic growth since World War II is the result of technological innovation. Today, the United States is a net importer of high-technology products and there is significant concern that the nation is losing its competitive edge.

Students are falling behind in science and math literacy, less science is being taught in K-12 classrooms, more teachers are afraid to teach science because of a lack of training in science fields and fewer undergraduate students are choosing to major in STEM fields.

“Economic studies conducted even before the information-technology revolution have shown that as much as 85% of measured growth in US income per capita was due to technological change.”

-National Academies Report Rising Above the Gathering Storm.

**Recommendations:**

The National Academies and many other STEM education stakeholders, including the geoscience community, recommend the following actions to help improve STEM education:

- **Teacher Preparation and K-12 education** - Ensure a sufficient supply of qualified teachers by providing scholarships for 10,000 new math and science teachers. Provide further training for current teachers through summer institutes and part time master’s programs to increase research based learning opportunities.

- **Research** - Increase federal funding for research by 10% for each of the next seven years.

- **Higher Education** - Fund 25,000 more undergraduate scholarships and provide 5,000 new graduate research fellowships in STEM fields.
Some Examples of Effective Geoscience Education Programs

National Science Foundation (NSF)
- Research Experience For Undergraduates (REU) provides opportunities for undergraduate students to participate in active research and includes significant student-faculty and student-student interaction.
- Graduate Teaching Fellows in K-12 Education Program (GK-12) provides funding for graduate students in NSF-supported STEM disciplines to acquire K-12 teaching skills that will broadly prepare them for professional and scientific careers in the 21st century. Graduate students help enrich STEM learning and instruction in K-12 schools.

United States Geological Survey (USGS)
- The Cooperative Summer Field Training Program, a collaborative effort between USGS and the National Association of Geoscience Teachers (NAGT), pairs undergraduates with USGS professionals for field work experiences. The program is the longest continually running internship in the Earth sciences, having served over 1,500 geoscience students.

National Aeronautics and Space Administration (NASA)
- NASA’s Kennedy Space Center hosts an Intern Project (KIP) for high school students each summer, allowing them to work in STEM fields on space center missions.
- The Cooperative Education Program at NASA’s Johnson Space Center allows geoscience students (undergraduates and graduates) to alternate semesters at school with semesters of full time, fully paid work at NASA facilities.

National Oceanic and Atmospheric Administration (NOAA)
- The Teacher at Sea (TAS) program provides an at sea research experience for K-12 teachers and college educators. Teachers gain a clearer insight of ocean research, and increase their level of environmental literacy by fostering an interdisciplinary research experience.
- The Bridge Ocean Science Resource Program is a joint effort under the Sea Grant program to enable educators and scientist to share more information in and among each other.

National Park Service (NPS)
- Geoscientists-in-the-Parks (GIP) programs collaborate with agencies to place undergraduate, graduate and professional geoscientists at national parks for 2-6 months of work. Positions vary widely and include participation in interpretation and education, research, hazard and development assessments and management within the National Parks.

Geoscience is critical to economic growth. Understanding Earth processes is essential to deal with energy resources, water resources, climate change and other critical needs. In the K-12 grade levels fewer and fewer students are taught any geoscience and fewer and fewer teachers have any training in geoscience. In addition, there are not enough geoscientists completing undergraduate and graduate degrees to meet the nation’s skilled workforce needs.
- Only 7% of high school students were taking an Earth science class in 2001.
- In the 1999-2000 school year, 79% of the high school students taking an Earth Science course were being taught by a teacher without a degree in the field.
- The NSF reported that of all of the STEM disciplines supported by NSF, the geosciences are most in need of an increase in the number of highly qualified teachers.

Workforce:
The Bureau of Labor statistics reports between 2006-2016 demand will increase:
- 58% for mining and geological engineers
- 43% for petroleum engineers
- 29% for environmental engineers
- 22% for geosciences

**All above growth is classified as “much higher than average.”

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