

Make STEM Education Inclusive of Students with Disabilities

To fill increasing numbers of positions in science, technology, engineering, and mathematics (STEM), the US must draw from a talent pool that includes all demographic groups. However, today individuals with disabilities experience far less success in STEM, and those who are also minorities, female, and/or veterans face multiple challenges. However, success stories in STEM fields demonstrate that opportunities exist for students with disabilities who successfully overcome barriers imposed by (a) inaccessible courses and technology/media; insufficient accommodations; and low expectations, as well as (b) inadequate skills in self-advocacy and access to STEM role models with disabilities. Efforts to increase participation in STEM by citizens with disabilities support NSF's mandate to apply the best ideas from the most capable researchers and educators.

Despite this need for inclusion, postsecondary STEM courses are often inaccessible to students with certain types of disabilities. For example, online courses often include documents in formats that are not usable by students who are blind and those with dyslexia and other reading-related disabilities; instructional videos often present videos without captions students who are deaf need to access the content. In addition, courses that teach design approaches rarely include those that ensure that products students design in engineering, computing, and other STEM courses are accessible to potential users with disabilities, even though technology-focused companies have reported that they are unable to locate enough professionals familiar with accessibility and even formed an initiative called Teach Access to promote the teaching of accessible design in computing-related courses.

Many traditional efforts to include people with disabilities in courses embrace a “medical model” of disability, where focus is on the deficit of the individual and how accommodations can be made so that he/she can fit into an established environment. In contrast, the “social model” of disability and other integrated approaches within the field of disability studies consider variations in abilities—just like gender, race/ethnicity—to be a natural part of the human experience and make efforts to design products and environments that are welcoming and accessible to everyone.

Universal design, defined by the Center on Universal Design at North Carolina State University as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design,” is an approach that is consistent with the social model of disability, addresses other diversity issues as well, and has the potential to minimize the need for individual accommodations. UD challenges society to go beyond ADA compliance to construct a world where everyone can fully participate. A body of literature reports promising practices for how UD can be applied to online and on-site courses to make them more inclusive of people with disabilities and benefit other students as well.

In conclusion, to meet the needs of students, science, and society in the year 2040 and beyond future STEM education should

- embrace disability as a diversity issue; a social model of disability; and universal design practices to empower students with disabilities in activities that increase their success.
- teaching about accessibility to STEM students ensures that a wide swath of professionals are prepared to ensure that future products are designed to be accessible to individuals with disabilities.

STEM education designed in this way will ultimately broaden the participation of individuals in STEM to include more people with disabilities and increase STEM fields with the expertise and perspectives of this underrepresented and underserved population.

To reach a state where STEM education is inclusive of students with disabilities and STEM professionals embrace accessible/universal design in their work,

- faculty need to learn the value of STEM students and professionals with diverse abilities, best practices in inclusive instruction, and accessible/universal design applications in their academic fields;
- institutions of higher education need to seek to hire future faculty with accessible/universal design teaching and product design skills; and
- companies, and other organizations in STEM areas need to include accessible/universal design skills in their job descriptions and apply them in routine practices.