Top 10 Ways to Engage Underrepresented Students in Computing

1

Select curricula that will engage students who are new to computing.
Game design, socially relevant assignments, and digital media are promising ways to engage students. Many faculty have had success using Alice, Scratch, or other user-friendly programs that enable students to learn

difficult computer science concepts before they are introduced to coding.

Encourage all of your students.

2

Simple written and verbal comments can make the difference between students taking another computing class or staying in the major, or not. Students are more likely to engage in tasks that they believe they can perform successfully, so focus encouragement on student progress, persistence, and effort, rather than just being "smart" or demonstrating prior computing experience.

Make the physical environment in your classroom and department inviting.

3

The physical environment conveys messages to students about who belongs in computing and who doesn't. Rooms decorated with images and objects associated with "geeky" stereotypes are typically less appealing and welcoming to women than are gender-neutral rooms. Knowing this, you can craft an environment that makes a broad range of people feel welcome.

Be sure your teaching style is inclusive.

4

Your instructional practices can level the playing field for underrepresented students who may come in with different prior experiences with and knowledge of computing. Inclusive instructional practices improve learning outcomes for all students, so rather than lecturing, hold interactive discussions. Invite student feedback on ways the classroom dynamics may inadvertently exclude some individuals or groups.

5

Include many opportunities for collaborative learning in your classes.

Collaborative learning, such as pair programming and peer-led team learning, can improve learning outcomes, retention rates, critical thinking, appreciation of diversity, and development of social and professional skills. In addition, research shows that female students feel more confident in classes using pair programming.

6

Meet students where they are.

Educational researchers emphasize the importance of linking educational materials and curricular programs to students' existing knowledge and experiences. Building on existing competence and putting the concepts of computing in appealing contexts can reduce entry barriers and provide those with limited experience an equal chance to succeed.

7

Minimize stereotype threats.

When stereotypes are invoked in the classroom, "stereotype threat" can occur, where students may fear that their behavior will confirm negative stereotypes about their "group," or about themselves as members of that group. This harms performance and motivation by reducing feelings of competence, belonging and trust. Create an environment where students feel recognized for their achievements, explicitly state that diversity is valued, and promote a growth mindset about intelligence.

8

Avoid gender bias.

Even individuals committed to equality harbor unconscious biases that impact everyday decisions and interactions. Experiments consistently show that women and their work are misperceived as less valuable than men, even when their demonstrated ability is identical. Women at all levels of computing have to work harder and often violate norms about feminine behavior to build authority and demonstrate belonging.

9

Provide role models for underrepresented students.

Letting students hear from a variety of role models helps to ensure they find someone to whom they can relate. Role models should share the techniques they used to overcome obstacles in their educational and career paths to help students see what is possible. When local role models are unavailable, you can use audio or video interviews with successful women and other underrepresented minorities in computing.

10

Connect students to support networks.

Student groups, clubs, or other formal get-togethers can help underrepresented students feel less isolated than they otherwise might and increase their sense of belonging. Research has shown that peer and near-peer mentoring can double the retention rate of female students in male-dominated courses.

Related Resources

EngageCSEdu (www.engage-csedu.org/)

How Can Encouragement Increase Persistence in Computing? Encouragement Works in Academic Settings (Promising Practice): (www.ncwit.org/academicencouragement)

How Does the Physical Environment Affect Women's Entry and Persistence in Computing? Design Physical Space that has Broad Appeal (Promising Practice): (www.ncwit.org/physicalspaceuw)

How Do You Recruit or Retain Women through Inclusive Pedagogy? The Conversational Classroom (Promising Practice): (www.ncwit.org/conversationalclass)

How Do You Retain Women through Collaborative Learning? Pair Programming and Peer-Led Team Learning (Promising Practices): (www.ncwit.org/pairpractice) and (www.ncwit.org/pltl)

How Do Stereotype Threats Affect Retention? Better Approaches to Well-Intentioned, but Harmful Messages (Promising Practice): (www.ncwit.org/stereotypethreatmessages)

How Can Reducing Unconscious Bias Increase Women's Success in IT? Avoiding Gender Bias in Recruitment/Selection Processes (Promising Practice): (www.ncwit.org/biasselection)

Give Students More Effective Feedback Using a Growth Mindset: (www.ncwit.org/feedbackstudent)

Entrepreneurial Heroes Interviews (Audio Recordings): (www.ncwit.org/heroes)

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