



Invent the Future: Quality, Innovation, Results: The 2006 - 2012 Strategic Plan Update

Engagement Scholarship Domain

VT-STEM

Education in science, technology, engineering, and math (STEM) is at the forefront of our nation's agenda. National and global development and sustainability are contingent upon fostering discovery and development in the STEM disciplines. Learning STEM concepts and skills not only prepares students to enter the workforce and develop productive careers, but it also gives learners skills to make informed decisions. Strong partnerships among schools with grades PK-12 and universities are necessary to ensure that STEM education efforts have the potential to meet these needs and enhance the scientific and technological literacy of our nation's workforce. Schools require equitable access to research-based STEM content and education resources. Additionally, there is a growing need for STEM teacher preparation, pre-service education, induction, and in-service professional development. As the commonwealth's senior land-grant university with special expertise in STEM fields, Virginia Tech is uniquely positioned to provide statewide and national leadership in transferring STEM research discoveries to PK-12 classrooms.

In addition, science learners of all ages, from kindergarten through graduate school, need to understand scientific inquiry, or the process of science. Scientists and engineers are trained to problem-solve by critically evaluating data, carefully considering others' ideas, and making informed choices about what experiments to conduct. Teaching students the skills of scientific inquiry and problem solving helps them to evaluate information in the newspaper and on television, carefully consider physicians' recommendations about their healthcare, and make informed choices as consumers.

Pre-college science education reform has focused on integrating scientific inquiry into all science learning experiences. Steps are being taken at the undergraduate level to emphasize design, discovery, and real-world problems rather than lecture-based information delivery. Graduate education in the sciences requires students to *do* science, from designing experiments to analyzing data to communicating findings.

Virginia Tech is committed to fostering exchanges of scientific and pedagogical expertise between PK-12 and university communities. One of several

mechanisms for enabling this dialogue is the Graduate School's Citizen Scholar Experience, through which graduate students in STEM fields share their skills and knowledge with PK-12 communities. The ultimate goal of such discourse is the creation of a STEM teaching and learning continuum from pre-kindergarten through graduate education.

The School of Education is bringing greater focus on STEM education through the recruitment of a senior scholar, who will lead a new interdisciplinary program in STEM teaching and learning research. Faculty and staff across the disciplines are engaged in strategic partnerships with PK-12 STEM education programs through Virginia Tech's Science, Technology, Engineering, and Mathematics K-12 Education Outreach Initiative (VT-STEM). VT-STEM serves as a bridge between PK-12 schools and the university by facilitating quality PK-12 STEM educational experiences; collaborating with the PK-12 community to enhance teacher preparation and professional development; and supporting Virginia Tech students and faculty in developing, implementing, and sustaining PK-12 STEM programming. The university will leverage its assets across the commonwealth, represented by 4-H and other education programs, to directly involve youth in STEM education programs.

Anticipated outcomes of these endeavors are PK-12 students who are better prepared for advanced education in STEM disciplines and PK-12 teachers who have easy access to STEM expertise. In addition, these efforts will result in university faculty who are champions for PK-12 education and model good teaching practices for future science and math teachers.

Goal III. Enhance PK-12 education and its continuity with undergraduate and graduate education, especially in the key disciplines of science, technology, engineering, and mathematics (STEM).

Strategies:

- Implement and expand PK-12 STEM teacher preparation.
- Implement and expand STEM partnerships and collaborations between the university and PK-12 schools.
- Provide quality STEM professional development for PK-12 teachers and other educators.
- Develop and implement a continuum of recruitment, from PK-12 to STEM undergraduate programs to STEM education graduate programs (teacher licensure, specialist degrees, etc.).
- Strengthen research and scholarship efforts related to PK-12 STEM education.

Performance Measures:

- Number of graduates prepared to take STEM teaching positions in PK-12 schools and STEM specialist positions in PK-12 school divisions.
- Number of PK-12 teachers and students in the commonwealth served through the university's educational support programming (graduate courses, continuing education programs, advanced certificate programs).
- Number of PK-12 students who successfully matriculate into and complete post-secondary education in STEM fields.
- Number of STEM undergraduates who successfully matriculate into and complete graduate programs in STEM education.
- Number of youths participating in non-formal and informal STEM-related projects.