

Priority 2: Competitive Preference Priority -- Emphasis on Science, Technology, Engineering, and Mathematics (STEM). (15 points, all or nothing)

To meet this priority, the State's application must have a high-quality plan to address the need to (i) offer a rigorous course of study in mathematics, the sciences, technology, and engineering; (ii) cooperate with industry experts, museums, universities, research centers, or other STEM-capable community partners to prepare and assist teachers in integrating STEM content across grades and disciplines, in promoting effective and relevant instruction, and in offering applied learning opportunities for students; and (iii) prepare more students for advanced study and careers in the sciences, technology, engineering, and mathematics, including by addressing the needs of underrepresented groups and of women and girls in the areas of science, technology, engineering, and mathematics.

The competitive preference priority will be evaluated in the context of the State's entire application. Therefore, a State that is responding to this priority should address it throughout the application, as appropriate, and provide a summary of its approach to addressing the priority in the text box below. The reviewers will assess the priority as part of their review of a State's application and determine whether it has been met.

Recommended maximum response length, if any: One page

Priority 2: Competitive Preference Priority – Emphasis on Science, Technology, Engineering, and Mathematics (STEM)

Dating back at least to the establishment of the Research Triangle Park in the 1950s, NC has viewed STEM education as critical to the success of our economic development. Most recently, the NC General Assembly moved forward on approving a set of statewide STEM goals developed by the Governor’s Education Cabinet and aligned across all education institutions. This set of goals and measures will cut across each level of the education pipeline and will align with the State’s economic development needs. NC’s commitment to a continued and expanded focus on STEM in PK-12 education initiatives also is reflected throughout this proposal.

As evidence of NC’s success so far, NC boasts a proportion far greater than the national average of students participating in Advanced Placement courses in mathematics (13.4% of the 2008 graduating class, as compared to 9.3% nationally) and the sciences (12.6% of the 2008 class, as compared to 8.3% nationally). In addition, NC scores outpace national averages on the SAT subject exams in math, biology, chemistry, and physics (see Section A3). In earlier grades, average scores on NAEP math assessments have been higher than national averages for over a decade at both grades 4 and 8.

P.2.i. Rigorous Course of Study

NC’s rigorous course of study in the STEM areas is documented in the Standard Course of Study in mathematics, science, computer/technology skills, and career technical education (which includes a pre-engineering strand). Beginning with the freshman class of 2010, all high school students now complete a *Future-ready Core Curriculum*. The graduation requirements for this curriculum include four mathematics courses, three science courses (a physical science, biology, and an earth or environmental science), and demonstration of computer skills through a State assessment. Special STEM-focused programs are used widely in NC schools, with, for example, 112 career academies directly related to STEM, including 60 pre-engineering academies affiliated with the national *Project Lead the Way* Engineering program.

In addition, many initiatives in this proposal directly support a rigorous course of study in the STEM areas, including the following:

- ***Ongoing development of new, rigorous standards and assessments in STEM subjects.*** NC’s dedication to improving math and science standards is exemplified by the work of the Accountability and Curriculum Reform Effort (which oversees the revision of all of NC standards to focus on deeper essential standards) and the scheduled adoption and integration of the Common Core standards into the Standard Course of Study in Summer 2010. This adoption will solidify NC’s commitment to internationally benchmarked, “fewer, clearer, and higher” standards. NC has been particularly active in the area of standards and assessment development in math, contributing to both the Common Core validation process in that area and the American Diploma Project’s common Algebra I and Algebra II assessments (Section B);
- ***Recruitment, preparation, and support of STEM teachers.*** Expanding the presence of Teach for America, developing the new NC Teacher Corps modeled after Teach for America, and introducing a comprehensive Induction Support Program for new teachers (Section D3) all will contribute to increasing the quality and impact of STEM teachers in NC’s highest-need schools. In addition, expanding UNC’s Teacher Quality Research program to include licensure area- and program-specific analyses (Section D4) will help to reveal concrete steps that can be taken to improve the quality of teacher preparation in STEM areas;
- ***Professional development programs and instructional improvement tools.*** These programs and tools will support improvements in teaching mathematics as a first priority within the RttT initiatives (Sections D5 and C3, respectively);
- ***Building a network of STEM-themed high schools throughout the state.*** As described in Section F2, RttT funding will help support the development of a small set of exemplary high schools, each focused on a STEM theme, such as biotechnology or aerospace, tied to the economic development of the region. These schools will serve as anchor schools in networks of STEM-themed schools, providing exemplary curriculum, serving as residency sites for participants in the regional leadership academies described in Section D3, providing opportunities for field placements and professional development for teachers, and serving as test-beds for innovation practices in STEM education; and

- ***Providing virtual courses in STEM areas to students statewide.*** One of the primary reasons for expanding the NC Virtual School (Section D3) is to provide all students with access to high-quality STEM instruction, even when such instruction is available to a limited degree in a student’s brick-and-mortar school. The *blended course* options also will support the growth and development of the on-site STEM teachers who partner with online master instructors to deliver their courses.

The technology infrastructure plan outlined in Section A2 is foundational to these and all other STEM education initiatives in NC.

P.2.ii. Cooperation Across Sectors

Many STEM education initiatives across NC already benefit from the involvement and support of universities, museums, businesses, foundations, and community partners. Examples include:

- ***The NC Business Committee for Education (NCBCE)***, located in the Office of the Governor since 1983, has provided an important link between the NC business and education communities. Many of NC’s major technology, banking, pharmaceutical, financial, insurance, manufacturing, and retail businesses are represented on the Committee, and the organization supports all aspects of education, with a specific focus on STEM areas and workforce development (*e.g.*, the NC Center for 21st Century Learning is housed within NCBCE);
- ***The NC STEM Community Collaborative***, funded by the Bill & Melinda Gates Foundation, is designed to create a structure for local, regional, and statewide STEM collaboration among leaders in business, government, education, and economic development. It facilitates communities seeking to improve local education to take advantage of the economic opportunities that STEM offers. The Collaborative also links NC’s business and educational assets to community-led STEM approaches, creating cross-community networks as well as connections to the national STEM network. The activities of this Collaborative will be coordinated with the RttT STEM initiatives, providing opportunities for communities to further enhance strategic staffing (Section D3), professional development (Section D5), STEM schools development (Section E2), and other STEM-related initiatives in their communities;
- ***The NC Learning Technology Initiative (NCLTI)*** is supported by a combination of a private foundation (Golden LEAF Foundation), business (*e.g.*, SAS Inc., AT&T, CISCO, Lowe’s), and NC legislative funding to enable programs in which every

teacher and student has a laptop computer, with professional development, curriculum integration, and program evaluation also supported. As a result, 1:1 laptop programs have been initiated or are being planned in at least 38 of the 115 LEAs in NC. The emphasis of all these programs is STEM education, with a strong focus on college and workplace readiness. The Education Technology Cloud and statewide digital resources initiative described in Section A2 is closely linked with the NCLTI, providing the statewide infrastructure necessary for its expansion and success;

- ***The NC eLearning Commission***, appointed by the Governor and comprised of PK-12, higher education, business, and government leaders, has guided the development of the NC Virtual Public School, the School Connectivity Initiative, and, most recently, the development of the NC eLearning Portal. This group will play a central role in the Education Technology Cloud initiative described in Section A and in the use of virtual learning for students (Section D3) and educators (Section D5);
- ***The K-12 STEM Education Group*** at NC State University is comprised of leaders responsible for engineering outreach programs, 4-H youth development programs, the Kenan Fellows Program for teacher leaders, the Science House professional development and student outreach programs, the education initiatives of the Solar Center, and a pre-college STEM program for students from underrepresented groups. Members of this group will serve in an advisory role for the K-12 STEM initiatives as a whole, and they also will be involved in specific initiatives, such as the technology initiative (Section A2), the development of standards and assessments in the STEM areas (Section B), pre-service and professional development for teachers in STEM content areas (Section D), and the STEM schools network (Section E);
- ***The UNC-Baccalaureate Education in Science and Teaching (UNC-BEST)*** licensure program (described in Section F3), a fast-track licensure program for undergraduate science and math majors, has been made possible through the support of the Burroughs Wellcome Fund, an independent private foundation dedicated to advancing the biomedical sciences by supporting research and other scientific and educational activities. Burroughs Wellcome committed over \$5 million to the development of UNC-BEST; and

- Most recently, NC has created the *Joining our Businesses and Schools (JOBS) Commission*, which is chaired by Lt. Gov. Walter Dalton. The JOBS Commission will create a partnership between public schools, community colleges, and private businesses to ensure the appropriate educational curriculum is in place for students to maximize their employment potential upon graduation. In particular, the Commission will work with both public and private programs focused on STEM areas. Additional information can be found in Section E.

P.2.iii. Preparation for Advanced Study and STEM Careers

Advanced Preparation for Underserved Populations

The rigorous course of study in the STEM areas, the many initiatives and collaborations focused on strengthening STEM teaching and learning, and the RttT initiatives described in this proposal are all tied to the statewide goal of preparing more students for advanced study and careers in the STEM areas, with a specific emphasis on students from groups that traditionally have been underrepresented in the STEM areas. Example programs include the *Math and Science Education Network Pre-College Programs* on nine UNC campuses that prepare underserved students at the middle and high school levels for careers in the STEM areas, and the *NC State Women in Engineering Outreach Program* that encourages young girls and women to consider careers in the STEM disciplines.

The North Carolina School of Science and Mathematics

At the most advanced level, NC takes great pride in its *School of Science and Mathematics*, the nation's first public residential high school with a specialized curriculum in science and mathematics for advanced students, which has served as a model for other schools nationally and worldwide. A constituent institution of the University of North Carolina, the school boasts a faculty with exceptional credentials – one-third hold a doctorate and one-fourth are National Board-Certified. Students come from every LEA in NC, and almost two-thirds of all graduates enter science- or math-related fields. In addition to serving its 650 full-time students, the school provides Advanced Placement courses and enrichment programs to nearly 4,000 NC students statewide each year through distance education and extension programs, and it has provided professional development for more than 5,000 NC educators.