

To: WRHS School Board
From: Diane Tandy, WRHS Teacher
Date: December 2010
Re: STEM Academy Proposal

The need to develop a comprehensive plan to increase student achievement must be a priority for all schools if the United States is to remain competitive in a global economy, according to the National Governors Association Report (2008). A key ingredient in improving our public education system is to strengthen student knowledge and skills in STEM (Science, Technology, Engineering, & Mathematics) areas. This report also states that within the next five years, 15 out of the 20 fastest growing jobs will require significant science and math training to be successful. Therefore, if students dismiss their opportunities to take more math and science courses while in school, they are effectively minimizing their job opportunities and limiting their future earnings potential.

In addition, for the last decade colleges have become increasingly aware of the increased need of remedial math classes for incoming freshman. According to the New Hampshire Department of Education, about 70% of incoming students were placed in developmental math courses. This figure mirrors the number of students in high school (68%) who scored below proficient on the state NECAP (New England Common Assessment Program) assessment. Clearly, more needs to be done to help students become more proficient in STEM areas in order to be successful once they graduate and enter the workplace.

The Need for a STEM Academy at WRHS

WRHS, like many other schools in the nation, has a history in recent years of not making AYP (Adequate Yearly Progress) proficiency targets in either reading and/or mathematics on the NECAP tests (WRHS website). Based on state and federal accountability standards under NCLB (No Child Left Behind), the high school is now considered a SINI (School In Need of Improvement). As a result, the District has developed a plan for continuous improvement that outlines areas of focus expected to impact test scores. The partial list taken from the school district's website (www.winnisquam.k12.nh.us) includes the following goals:

- To increase student proficiency in math, reading, and science
- To focus on literacy in all subject areas
- To provide extensive professional development for math teachers
- To integrate technology more regularly in the classroom

The District's Strategic Plan also outlines some relevant goals which include:

- To develop a middle and high school committee to explore career pathways possibilities
- To investigate other alternative programs

One way to address the goals above is the implementation of a STEM Academy into the course of studies at WRHS. This can be accomplished without constructing any new buildings or buying new equipment. Program costs will be minimal (bus transportation for any field trips) and are expected to be covered through already budgeted school funds, student contributions, private donations or grants. Initial funding research shows that there are several viable options within the state as well as hundreds more on a federal level. Using existing STEM courses and teachers, the STEM Academy can be thought of as an alternative program within the high school with additional recognition at graduation as well as on the student's diploma and transcript. This new focus on STEM content areas for students, teachers, administrators, and the community should serve as a constant reminder of the efforts to support STEM education at the high school with rigorous and relevant courses for students while providing extra learning opportunities that recent studies are suggesting are so vitally important to preparing them for their future.

Structure of Program

The basic structure of the proposed STEM program will initially consist of *four* main priorities:

- Increased course focus on STEM classes
- Active participation in monthly STEM program meetings
- Active participation in monthly STEM after-school activities
- Completion of an internship/apprenticeship

Students who successfully complete the STEM Academy program will receive recognition in the form of an endorsement on their diploma and transcript, as well as a special cord and award to wear at graduation.

Presently, students are required to take 3 credits of mathematics, 2 credits of science, and one credit of computer technology for graduation. However, beginning with the class of 2013 (current sophomores), one additional credit of science will be required, bringing the total of STEM-focused courses to seven. Many school districts are changing their approach to STEM education in order to increase basic competencies in math and science which is what the WRHS STEM Academy hopes to address over the next three to five years.

Coursework Requirements

- A minimum of 11 credits in science, math, computer programming, graphic design, computer-aided design (CAD), specific agriculture education courses, as well as some specialized courses at the HUOT Technical Center in Laconia that include Introduction to Engineering, Principles of Engineering, Modern Robotics, and Biotechnology.
- A minimum of 7 math and science courses in grades 9-12
- An additional 4 courses (any STEM area) at any time during WRHS career

After-School Activities (10 after-school STEM activities must be completed per year)

- Science Fair * *Required of all Students*
- Expo Night
- Programming Competition
- FIRST Robotics Competition * *Required of all Students*
- Fast-Track Racing Team * *Required of all Students*
- NH Department of Transportation Bridge-Building Competition **Required of all Students*
- Science Olympiad Team
- Math Team
- Other selected opportunities

Regular Meetings (required attendance at monthly STEM meetings after school)

- Exploration of STEM careers
- Computer, science, or engineering projects
- Math, science, or computer games
- Other activities that students/faculty advisors will plan and organize

Additional Graduation Requirements

- Students (Class of 2012) would have the option to complete an internship/career exploration centered in one STEM field; Class of 2013 and beyond must complete 40 hours in at least two STEM fields.
- Students' portfolios must show proficiency in STEM content areas
- Students must achieve a minimum score of 2 on both Math and Science NECAP tests
- Other requirements may be added as program goals dictate

Expected Outcomes

In the first year, the expectation is that 20-25 students from all grade levels will likely petition to join the STEM Academy. The anticipated goal is to increase participation by 30% each year during the first two years with an expectation that at the end of 5 years, approximately 80 students will be actively participating and eventually completing the program. Data will be collected on student achievement (GPA, standardized test scores, etc) while in high school and compared to data that can be collected after high school (college attendance, job status, income level, etc.) to see if participation and focus of the STEM Academy plays any discernable role in student economic and academic success after high school. The initial expectation is that it will have some noticeable impact.

"To transform our culture by creating a world where science and technology are celebrated and where young people dream of becoming science and technology leaders." Dean Kamen- Inventor, Entrepreneur, and Founder of US FIRST (Robotics competition)