

Implementation Plan for Student Spaceflight Experiments Program (SSEP)
Mission 1 to the International Space Station
<http://ssep.ncesse.org>

Community:

Fitchburg, Massachusetts
Montachusett Regional Vocational Technical School

Proposed SSEP Community Program Director:

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1. Community Demographic Information

Montachusett Regional Vocational Technical School (more commonly known as Monty Tech), located in Fitchburg, Massachusetts, is a four-year vocational-technical high school and is accredited by the New England Association of Schools and Colleges (NEASC). Monty Tech was founded in 1965, and has graduated more than 5000 high school students since opening its doors.

Montachusett Regional Vocational Technical School provides a progressive and safe learning environment that is home to advanced career and technical training, in addition to rigorous academic curriculum. By evaluating current instructional methodologies, program relevancy, and trends in the labor market, Monty Tech faculty and staff consistently demonstrate their commitment to providing students with every opportunity to succeed in both the classroom and in today's ever-evolving world of work. Currently, there are 1,400 students enrolled in twenty (20) different vocational programs, as follows:

Auto Body: Collision Repair Technology	Engineering Technology
Automotive Technology	Graphic Communications
Business Technology	Health Occupations
Cabinetmaking	House Carpentry
Cosmetology	Industrial Technology
Culinary Arts	Information Technology
Dental Assisting	Machine Technology

Drafting Technology
Early Childhood Education
Electrical

Masonry
Plumbing
Welding/Metal Fabrication

Monty Tech serves students in grades 9 – 12. There are currently 770 males, and 630 females enrolled. Of these students, 30.6% are designated low-income, and 9% are designated “First Language not English”. Racial Demographics: African American 1.7%, Asian 2.1%, Hispanic 12.9%, White 78.7%, Multi-Race, Non-Hispanic 4.4%, Native Hawaiian, Pacific Islander 0.1%.

The 1,400 students currently enrolled at Monty Tech comprise one of the largest enrollments in a Massachusetts vocational school, hailing from the following communities:

Ashburnham	Harvard	Princeton
Ashby	Holden	Royalston
Athol	Hubbardston	Sterling
Barre	Lunenburg	Templeton
Fitchburg	Petersham	Westminster
Gardner	Phillipston	Winchendon

MRVTS is home to a number of active advisory councils, with members who are eager to help shape vocational training programs and advise instructors. Advisory councils to programs throughout the school are encouraged by the proposed collaboration between Monty Tech and the National Center for Earth and Space Science, and eager to see cross curriculum instructional strategies that engage young learners in science education.

As business leaders in the area, council members are keenly aware of the importance of a highly skilled workforce, and of the expected rise in entry level opportunities in science, technology, engineering, and mathematics related fields. While the school community’s industrial base has traditionally been mills lining the Millers and Nashua Rivers, reliance on the mills in some of our communities has given way to pharmaceuticals, tool and die makers, small scale woodworking, machine manufacturers, plastic molders and textile producers. As a result, Monty Tech educators and advisory councils work together to provide educational

programs that not only engage young learners, but also address critical workforce development demands. Monty Tech faculty and staff are pleased to submit a proposal for consideration to the Student Spaceflight Experiments Program (SSEP).

2. STEM Education

The strategic need for our school community in STEM Education is two fold. First, the short term need is to dramatically increase student interest and preparation for careers in STEM fields. Our students need to be empowered by asking authentic questions about the world in which they live in order to “train up” and inspire the next generation of scientists. Our students need to be given the opportunity to use their math and science skills to develop and analyze an experiment. They need to be engaged and experience the competition for resources and understand the importance of the communication skills they have been learning to master. These students have an additional educational asset from which to draw in that they have been gaining vocational technical training. This provides a unique launching perspective for the questions and connections they may ask due to their experiences and understanding. They would benefit from the opportunity to integrate all of their educational experiences.

The long term strategic needs would be engaging and educating students, families and the public through exhibits and programs, professional development opportunities to assist teachers in STEM education and the integration of science, math within the technical areas. One of our school initiatives, which has been accomplished, was to increase our female enrollment. The second part of that initiative is to encourage and foster females to pursue career fields in science, math, engineering and technology.

SSEP has assisted us in meeting some of these goals and can continue to assist by selecting our community for a student experiment to be placed on the International Space Station as well as assist us with our longer term needs of educating the students, families and public.

3. SSEP on STS-135: Program Impact

In spring 2011, our school participated in the historic STS-135 Atlantis flight. We offered 1400 students the opportunity to engage in an experimental design competition. More than 400 students participated in the program. Of those students, we received 34 completed proposals of which 27 were forwarded to the first review panel. This panel consisted of both current and retired science and vocational instructors as well as an administrator. Three finalists

were selected and those were forwarded to the second review panel at the Carnegie Institute. <http://ssep.ncesse.org/2011/05/ssep-is-proud-to-announce-the-student-proposals-selected-for-spaceflight-on-sts-135-the-final-flight-of-the-u-s-space-shuttle-program/>. The student team experiment selected for flight posed the question: Does microgravity affect the growth rate of *Lactobacillus acidophilus*? These students continued working forward, prepared samples for flight and was able to view the launch. Currently, they are working with a researcher from Massachusetts Institute of Technology analyzing their data and preparing to present their findings to multiple audiences.

SSEP has led to these strategic efforts in STEM in the school:

- Formation of a STEM club at the school whose mission is to enhance, enrich and extend the current curriculum.
- Mobilized excitement about STEM education and potential careers in STEM by inspiring students through previous SSEP experience.
- Reinforcing the methodology of integration between academic and trade areas in vocational technical education
- Parents have been mobilized by seeking ways to help support our students in development of the STEM activities. Parent group is projected to form this fall.
- Perceived changes regarding STEM in students. Students now are able to make better connections between their academic education and technical education. They also see that they can do meaningful science activities now and do not need to wait until they are adults to ask questions about the world in which we live. This has empowered our students to work hard and reach “for the stars”.
- Perceived changes regarding teaching science in teachers. Teachers have begun to see the value of teaching science as more than just conveying a body of knowledge pipelined through a specific discipline. Teachers have had the opportunity to integrate inquiry into their instruction and focus on research and inquiry skills in addition to teaching the state frameworks for their science discipline.
- New connections to research and professional learning communities. We now have a working relationship with the Massachusetts Institute of Technology’s Dept. of Earth, Atmospheric, and Planetary Sciences. In addition, there were other institutes and professionals such as Mount Wachusett Community College’s Biotechnology Department who have assisted students with technical questions.

- New connections to local organizations such as the Community Foundation of North Central Massachusetts as well as federal education institutions such as Massachusetts Space Grant Consortium MIT
- SSEP student presenters at public events such as Starfest hosted by the Aldrich Astronomical Society and One Giant Leap.
- Space Day is being hosted at Monty Tech this year versus the Boston Museum of Science and sponsored by Mass Space Grant.
- Our current STS-135 student research team will be serving as ambassadors for STEM education throughout the state. They will be creating videos, attending workshops, conferences, the statehouse, and presenting at the NCESS National Conference. These students will be going back to their middle schools in their communities and talking about their experiences.
- Media coverage and publicity for community: We held a press conference on June 18th. Many distinguished guests were in attendance: State Senator Jennifer L. Flanagan, State Rep Stephen L. DiNatale, Mayor P. Mark Hawke, Lisa Sandler, and Acting State Director Office for Career Vocational Technical Education Dept. of Elementary & Secondary Education, grant donors – Community Foundation of North Central Massachusetts, Mass Space Grant MIT, North Central Massachusetts Workforce Investment Board, as well as newspaper reporters. Many newspapers have run multiple articles and are continuing to cover the progress of the STS 135 mission. They include: Athol Daily News, Gardner News, Sentinel & Enterprise, Worcester Telegram, Winchendon Courier, and Barre Gazette. We have also been featured on the SSEP website and NASA.gov In addition, there will be a feature article in the Skills USA magazine as well as the American Dental Assistants Association National Journal this fall.
- Links to some of these publications:
 - http://cmwib.org/ESW/Files/MONTY_TECH_SCIENCE_EXPERIMENT_SELECTED_FOR_FINAL_SPACE.pdf
 - <http://www.scribd.com/doc/59152055/38/STUDENT-EXPERIMENTS>
 - <http://www.telegram.com/article/20110618/NEWS/106189953/0/comics>
 - <http://www.nasa.gov/audience/foreducators/fitchburg-mass.html>
 - <http://atholdailynews.com/main.asp?Search=1&ArticleID=71207&SectionID=80&SubSectionID=194&S=1>
 - <http://ssep.ncesse.org/?s=sts+135+finalists&submit=Search>

- <http://atholdailynews.com/main.asp?Search=1&ArticleID=69746&SectionID=80&SubSectionID=195&S=1>
- <http://atholdailynews.com/main.asp?Search=1&ArticleID=68774&SectionID=80&SubSectionID=194&S=1>
- <http://blog.careertech.org/?tag=monty-tech>
- <http://www.chicagoteeth-whitening.com/four-monty-tech-juniors-experiment-will-be-on-space-shuttles-final-flight/>
- <http://blog.careertech.org/?p=3824>
- <http://www.telegram.com/article/20110825/FLASH/108259974>

4. Proposed Student Spaceflight Experiments Program:

There has been a ripple effect throughout our community and we have many people excited at what high school students are doing. The next step in the process is to keep the momentum moving forward by engaging in the SSEP ISS mission. All 1400 students will be offered the opportunity to participate in a school wide scientific experimental design competition to place an experiment aboard the International Space Station in April 2012. For STS-135, we had 27 final proposals for review. An additional goal of this program is to triple the number of student proposals and broaden the size and scope of the involved student population. More teachers and students have expressed interest and will be engaged due to the success of the previous program as well as expanded time constraints. In addition, the STEM club will provide a teacher facilitator to undergird any student interested in developing a proposal.

Two student experiment design patch competitions will also be held. The first will include our student population at Monty Tech. The second will be an extension competition inviting any student grades K-8 from all 18 sending school communities.

5. Budget

Request:

We are requesting: \$19,950 for the SSEP program supplied by the National Center for Earth and Space Science Education. This covers the basic cost of participation in SSEP.

Matching funds:

Montachusett Regional Vocational Technical School is committing significant staff time to this effort, corresponding to \$44,050, as well as providing a commitment to securing an additional \$15,050 for non-salary line items. Both these matching contributions are detailed in the Tables below, and correspond to a combined \$59,100.

Staff	Number of staff	Hours	Fully Burdened Hourly Rate	Subtotal
SSEP Community Program Director	1	125 +	\$100/hour	\$12,500
Teachers	10	20 avg.	\$90/hour	\$18,000
Administrators	4	15 avg.	\$200/hour	\$12,000
Substitute teachers	10		155 per day	\$1,550

Total In-Kind Staff Time \$ 44,050

Non-salary line items:

Supplies	\$2000
T shirts and pins	\$1100
Travel to Washington, D.C.	\$9000
Shipping	\$300
Student Awards	\$300
Travel to research facilities for analysis	\$350
Outreach presentations	\$2000
TOTAL:	\$15,050