

STOMP - Student Teacher Outreach Mentorship Program

United States
Merredith Portsmore



Organization type:

nonprofit/ngo/citizen sector

Budget:

\$50,000 - \$100,000

Website:

<http://www.ceeo.tufts.edu>

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Project Summary

Elevator Pitch

Concise Summary: Help us pitch this solution! Provide an explanation within 3-4 short sentences.

If we want children to be the next generations of innovators, we have to give them practice innovating. Tufts STOMP (Student Teacher Outreach Mentorship Program) does this by working on a grassroots level to bring opportunities for K-12 students to innovate through engineering design activities. STOMP pairs interested teachers with undergraduate engineering students to form a team that implements open-ended engineering design projects. The program is unique in that it aims to impact the K-12 classroom by empowering teachers as well as the undergraduate engineering student by preparing them to become educational change agents when they graduate and enter the engineering workforce.

About Project

Problem: What problem is this project trying to address?

Tufts STOMP focuses on the communities of greatest need that are adjacent to the Tufts main undergraduate and medical campuses. As such, STOMP is primarily involved in the Somerville, Medford, and Boston Public Schools. The schools STOMP works with in these communities have a free/reduced population that ranges from 50% (Medford) to 75% (Boston) and are on average 50-60% minority populations. In order to find enough placements for all the interested undergraduates, STOMP does work with other communities (Arlington, Winchester) that have a much lower free/reduced lunch population and fewer minority students. However, preference is given to our target communities (Medford, Somerville, Boston). The three districts have very traditional school structures and often required curricula for science and mathematics. STOMP started by mailings to schools and information sessions. However, now STOMP spreads generally by word of mouth from teacher to teacher. Often times, one maverick teacher will start with STOMP and other teachers will see the kids excitement and be willing to try engineering in their own classroom.

Solution: What is the proposed solution? Please be specific!

STOMP is innovative in a number of ways. One of the primary ways is our grassroots, bottom-up and sustained partnership approach. STOMP doesn't go through school administration, we don't have a fixed curriculum that teachers have to use. We advertise directly to teachers to apply to the program and work with them to figure out what would work in their classroom. We have a three phase model that is generally executed over 3 to 5 years. The initial phase puts more of the teaching responsibility on the undergraduate engineering students, evolves into a co-teaching experience in the second phase, and then transitions to the teacher leading the class in the final phase. We know it takes time, experience, and practice for teachers to be comfortable teaching engineering activities. We make long-term commitments to teachers and let them "try" engineering in a supported situation with lots of resources. Our second major innovation is paying attention to all stakeholders. We're not only looking to impact the K-12 classroom but the undergraduate engineering students that work in STOMP as well. Our engineering students will go on to be parents, voters, managers, and some day the leaders of engineering companies. We work to make sure they learn about educational issues from policy and curriculum requirements to classroom management and theories of learning. We want our engineering undergraduates to leave their STOMP experience as advocates and future supporters of innovative education.

Example: Walk us through a specific example(s) of how this solution makes a difference; include its primary activities.

Open-ended engineering design activities give K-12 students a chance to do the "messy" problem solving not typically found in school. Experience with this is critical for not only getting students interested in engineering but for developing the next generation of However, bringing hands-on engineering design into the K-12 classroom is challenging on multiple levels. Many teachers have had little experience with engineering. In addition, 25 or more students engaged in hands-on construction can be challenging for any single adult to manage. STOMP addresses these challenges by training engineering undergraduate students to support engineering activities in local K-12 classrooms for 1-2 hours each week throughout the academic year. STOMP undergraduates spend time learning about multiple education issues ranging from curriculum to classroom management and participate in a weekly seminar series. Each Fall and Spring, teachers apply to Tufts STOMP program and are matched with two undergraduate engineering students. The team of teacher and undergraduates plan activities for the semester. The STOMP program provides materials for the classrooms. Classroom activities range from learning about simple machines and designing an amusement park to integrating with a social studies on ancient Egypt in order to build a robot to help build a pyramid. Teachers can participate for one semester (Fall or Spring) or all year long depending on when they can fit engineering into their classroom schedule. STOMP is unique in that we work directly with teachers to empower them to figure out what kind of engineering activity would work best in their classroom. Moreover, the undergraduate students have first hand experience working in K-12 classrooms and weekly training and discussion sections to enable them to be informed education change agents as they become leaders of industry, voters, and parents.

About You

Organization:

Tufts Center for Engineering Education and Outreach

About You

First Name

Merredith

Last Name

Portsmore

About Your Organization

Organization Name

Tufts Center for Engineering Education and Outreach

Organization Phone

617-627-5888

Organization Address

474 Boston Ave, Curtis Hall, CEEEO

Organization Country

, MA, Middlesex County

Country where this project is creating social impact

, MA, Middlesex County

How long has your organization been operating?

More than 5 years

Is the project that you are entering related to this organization?

Yes

The information you provide here will be used to fill in any parts of your profile that have been left blank, such as interests, organization information, and website. No contact information will be made public. Please uncheck here if you do not want this to happen..

Innovation

What stage is your project in?

Operating for more than 5 years

Share the story of the founder and what inspired the founder to start this project

STOMP was founded in 2001 by Merredith Portsmore. After pursuing undergraduate degrees in Mechanical Engineering and English at Tufts, Portsmore fell in love with the work that the Center for Engineering Education and Outreach (CEEEO) was doing to bring engineering to the K-12 classroom. She stayed on at Tufts for a Master's in Education to develop her understanding of educational issues and then began to manage many of the center's professional development and outreach efforts.

In 2001, with the Massachusetts inclusion of engineering in the state standards there were more teachers interested in trying engineering. The hands-on nature of engineering daunted many teacher but with a small amount of classroom support many of the teachers who attended the PD were able to feel successful. Portsmore came up with the idea for STOMP as she was trying to match a supply with a need. Teachers needed support and Tufts had a supply of capable and charismatic undergraduate engineering students. The program started as just a way to support teachers, who were new to engineering activities, with content experts and an extra set of hands. However, it quickly became apparent that spending time in a K-12 classroom was beneficial to the undergraduate students who could hone their presentations skills as well as their ability to explain complex topics to by working with children and teachers on engineering design activities. The program has evolved to be a partnership between

teachers and undergraduate students that is mutually beneficial.

Social Impact

Please describe how your project has been successful and how that success is measured

STOMP has a number of indicators of success. There has been a continued high interest level from teachers applying to the program and undergraduate engineers applying to support those teachers. To date, nearly 300 undergraduates and 140 teachers have teamed up to serve an estimated 2400 area students. Undergraduate students who have participated in STOMP have started STOMP outreach programs at other universities as well as at corporations where they have gone on work. STOMP participants who go on to graduate students cite their STOMP experience as being useful as they go on to be teaching assistants.

Metrics have been a challenging aspect for STOMP as the hour per week fellows spend in the classroom doing different types of lessons is a small amount of time compared to students and teachers other experiences. STOMP has become an area of interest for research in the Department of Education at Tufts. Adam Carberry's 2010 doctoral dissertation looked at service learning experiences for undergraduate engineering students, which includes STOMP as well as other programs. Using survey instruments, Carberry found that when students were asked to assess where they learned various engineering knowledge and skills, students targeted their service learning experience as being a significant learning source for their technical knowledge as well as their "soft skills" (communication, project management). This suggests that STOMP's impact on the undergraduate students is as significant as much of their coursework.

In addition, this past year, Elsa Head, a master's student in the Department of Education looked at a cross section of teachers involved in STOMP. She did classroom observations as well as administered engineering self-efficacy surveys of teachers who were new to STOMP, had been in STOMP for 2-4 years, and those that have been in STOMP for more than 5 years. Her results indicated that teachers who had been in STOMP for multiple years had a higher engineering self-efficacy than newer STOMP teachers, suggesting that STOMP helps develop teacher's confidence in implementing engineering. Her classroom observations also indicated that teachers presentation of engineering design also evolve as they participate in STOMP. Teachers who were newer to STOMP had more simplistic, formulaic presentation of engineering design while older teachers were able to be thoughtful about engineering design as a model that can help guide design activity. These two pieces of research are supportive of the positive impact STOMP is having. They will be used to inform future development of metrics as we look for funding to support evaluation.

How many people have been impacted by your project?

1,001- 10,000

How many people could be impacted by your project in the next three years?

1,001-10,000

How will your project evolve over the next three years?

With demonstrated interest in this method of K-12 outreach, STOMP is looking for funding to improve teacher professional development as well as evaluation and research. To that end, STOMP was recently awarded a grant from the Verizon Foundation to develop a STOMP experience that focuses on women (W-STOMP). The funding will provide funding for ten 4th and 5th grade teachers to participate in professional development focused on how to engage girls in engineering, female STOMP undergraduate engineering mentors for those classrooms, and a summer camp experience for the 4th and 5th grade students. The W-STOMP program will look at how student interest change over the course of the program as well as the teacher's self-efficacy and confidence.

Sustainability

What barriers might hinder the success of your project and how do you plan to overcome them?

STOMP has operated as a grassroots, bare bones program within Tufts Center for Engineering Education and Outreach. We've tried to serve as many classrooms as possible and include as many undergraduates as possible and have focused the majority of our funding on these areas. To date, this has been done at the expense of evaluation and data collection. This is an area of that we are trying to figure out how to develop and improve. We plan to focus on measuring teacher self-efficacy and student attitudes/interest in engineering and other STEM careers.

Tell us about your partnerships

STOMP at Tufts partners directly with teachers to facilitate our bottom-up approach. Other universities have been interested in starting STOMP programs and we have partnered with Princeton, MIT, University of Hawaii, University of Colorado, Boulder, and University of Southern California, Los Angeles, to start STOMP programs at their locations.

Explain your selections

To date, STOMP has been supported by small donations from individuals as well as significant donations from foundations. Donors include National Instruments Foundation, LLL Foundation, The Stacey C & Robert R Morse Family Foundation, QinetQ Corporation, and Symantec Foundation.

How do you plan to strengthen your project in the next three years?

The challenge to sustaining STOMP is creating compelling data for funders without changing the core elements of the program that are successful and unique. STOMP was modeled after a student volunteer organization with minimal administration. Efforts over the next 12-18 months will be exploring useful metrics that can better characterize and evaluate the program. STOMP will also make stronger ties to research projects at the CEEO that have compelling data about the efficacy of engineering (<http://ceeo.tufts.edu/Research-Projects/reese.html>).

Partnerships and Accountability

Please tell us more about how your partnership was formed and how it functions. What specific role does each partner play? What unique resources does each partner bring to the initiative?

Our partnerships focus on specific teams of students and teachers, as we call it:

The 'S-T' in STOMP: A Student-Teacher Team

Both members of the undergraduate student-teacher team uphold a responsibility to contribute their respective expertise to the program. The undergraduate student's role is to enhance the engineering knowledge of the teacher and students including: developing a curriculum with hands-on

engineering activities, creating resource materials, and providing assistance in the classroom. In turn, the responsibilities of the teacher include: helping the fellow become familiar with working in a classroom setting, integrating engineering across disciplines taught in the classroom, and becoming self-sufficient to teach engineering curricula in the future.

How are you building in accountability for students' successful STEM learning outcomes? Please provide a summary and examples.

STOMP engages in using activities and curricula from Tufts Center for Engineering Education and Outreach. Many of these activities haven't been evaluated for their STEM outcomes and this has been identified as a weakness and challenge. However, the CEEO has recently developed and tested four science units (<http://ceeo.tufts.edu/Research-Projects/reese.html>) that use engineering as the context for learning required science content (sound, simple machines, properties of materials, and animals). Comparing classroom using the engineering-based units with those using traditional science content, the classrooms using the engineering-based units showed statistically significantly greater gains on science content tests (administered pre/post). These results suggest that engineering can be useful and powerful for helping students learn required science content. STOMP has begun to use some of these units in their classrooms with teachers.

Needs

Investment, Marketing/Media, Research/Information, Pro-bono help (legal, financial, etc.).

Please use this space to elaborate on your selection above and/or to add needs that may not be listed.

STOMP has been operating on a small budget, trying to focus efforts and funding on classrooms and undergraduate fellows. However, we would benefit from thinking about how to make our model more sustainable. We believe that generating more metrics would be useful but we also struggle with balancing the strengths of our program (teacher directed, custom solutions) with what makes for compelling data for potential funders. We're very committed to using engineering undergrads and the restrictions on their time also present challenges in the length and duration of our contact with schools.

Offers

Human Resources/Talent, Research/Information, Collaboration/Networking, Innovation/Ideas, Mentorship.

Please use this space to elaborate on your selection above and/or to add offers that may not be listed.

Tufts Center for Engineering Education and Outreach (CEEEO), the parent organization of STOMP, is a national leader in research, outreach and product innovation for K-16 engineering education. The CEEEO is very interested in forming collaborations with other organizations that are focused on engineering education and sharing our experience. We believe that children are budding engineers with productive ideas about the world and are conducting researchers to better understand how to leverage children's resources and intuitive ideas in the classroom. Moreover, we're engaged in developing software and hardware products that make bringing engineering into the K-12 classrooms.

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