

# WASHINGTON STEM + WASHINGTON MESA

## ENGINEERING FELLOWS PROGRAM EXECUTIVE SUMMARY

Engineering Fellows is a highly competitive program that brings engineering expertise directly into fifth grade classrooms around the state by partnering teachers with professional engineers and college students studying engineering.

Our two-organization team of Washington STEM and Washington MESA aims to ensure that almost 200 fifth grade teachers are equipped, empowered, and well-supported to deliver exceptional engineering curricula based on real-world challenges. In the first year this program will serve 30 teachers located in two diverse regions of Washington state. This program will engage professional engineers and college students in engineering to help provide teachers with engineering expertise through collaborative program development and implementation of real-world STEM challenges in classrooms.

### WHY ENGINEERING?



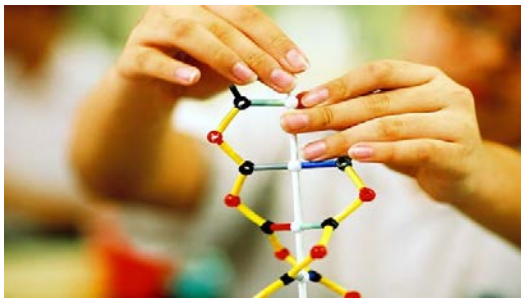
Engineering is essential to solving Washington's most complex challenges, including efficient transportation, environmental sustainability, affordable housing, and economic security. Engineering fuels our local job creation across every industry - tech, aerospace, manufacturing, clean energy, health and life sciences, agriculture and food manufacturing, construction, and retail. Yet most of our public school students have no formal exposure to engineering. Today's youth, especially in underserved communities, do not know what engineers do, do not see engineering as relevant to their everyday life and community, and do not see engineering as an accessible or desirable career option.

Education standards are changing. In 2013, Washington state adopted the Next Generation Science Standards (NGSS), which will be implemented for the first time in the 2016 school year. The NGSS have an emphasis on engineering that most students won't be prepared for given the current level of engineering education in classrooms - especially underserved classrooms - around Washington. We need to give students a fighting chance at academic success and great career opportunities by empowering teachers to teach core engineering principals with excitement and confidence.

### HOW IT WORKS

Teachers, engineers, and college students will apply for a fellowship to take part in the Engineering Fellows program. A cohort of each will be chosen and will begin their activities with an intensive Summer Design Institute (the Institute) with tiered time commitments based on participant roles. The Institute is an Immersive experience orienting teachers, college students, and engineers to the project and charging them to develop a teaching plan based on engineering Design Challenges. At the end of the Institute, we anticipate that participants, with the help of expert facilitators, will have developed a menu of ten engineering Design Challenges and related teaching plans.

The Design Challenges menu will be offered to fifth grade students at the beginning of the school year so that they can choose a meaningful challenge to work on throughout the year that resonates with their own lives. Teachers, college students, and engineers will then work together to teach the chosen challenges in thirty classrooms located in two diverse regions of the state. At the end of the school year, fifth grade students will present their final projects to a community-wide audience in coordination with the annual Washington MESA day celebration.



Throughout the project, our team will both implement the programming and provide comprehensive wraparound supports to help ensure the success of the project and encourage it to sustain and scale. From the beginning of the project we will coordinate a statewide advisory council to help inform, guide, and sustain the work. We will also hire an evaluator and secure a curriculum development specialist at the outset who can work alongside the project to document and codify the work and create comprehensive assessments of the program's success.

At the end of the project we will have a Playbook of the Engineering Fellows Pilot Program, two to three case studies of diverse classroom implementation, and up to four Real-World Design Challenges with related teaching plans that can be replicated and refined in Year Two.

### BY THE NUMBERS - PILOT YEAR

- 30 teachers would be selected to take part in the Engineering Fellows Pilot Program and receive stipends of \$4500/academic year
- Ten advanced-level college students will help provide intensive engineering expertise and will receive stipends of \$1500/quarter
- Three to five professional engineers will take part as volunteers with scaled-back time commitments
- Up to 200 students from underserved regions will participate

### VISION FOR THE FUTURE

Washington STEM is always on the hunt for the very best solutions to our education system's most pressing problems. Our goal with every program we take on is to see it grow, replicate, and scale so that we can help prepare all kids for great STEM futures. We have a strong three-year vision for the future of Engineering Fellows including the following milestones and metrics:

#### 6 Month Milestones

(January-June 2016)

- Key staff positions hired
- VISTA staff position secured
- Evaluator contracted
- Engineering Fellows Advisory Council formed and engaged
- Teachers, graduate students, and professional engineers recruited
- Summer Design Institute curriculum developed

#### 1 Year Milestones

(July-December 2016)

- Summer Design Institute complete
- Menu of ten Design Challenges complete, along with related teaching plans
- School year kickoff communications events complete
- One to two Quarterly Design Challenges complete (depending on teaching schedules)
- Three monthly meetings of design team members complete
- Two to three teachers identified for case studies; case studies in development
- Strategic sustainability plan complete
- Engineering Fellows Pilot Playbook in development

#### 2 Year Milestones

(January-December 2017)

- Playbook complete and used as guide to roll out cohort two
- Integrated Year One evaluation findings and refined program design
- Implementation underway at scale of 60 teachers
- Corpus of Year One Design Challenges available and shared with all cohort one and two participants

#### 3 Year Milestones

(January-December 2018)

- Implementation underway at scale of 100 teachers
- Reach between 5700-9300 fifth-grade students with effective and inspiring engineering education
- See an uptick in both teacher confidence and student achievement in engineering

## DOCUMENTATION AND SCALE

- Fully refined Engineering Fellows Playbook and documented research regarding efficacy of the program for both teachers and students
- Program implementation in additional Washington MESA schools around the state, Washington STEM Network schools and partners
- Establishment of Engineering Education Certification through the Office of the Superintendent of Public Instruction (OSPI)
- Aligned development of an Engineering Education certification pathway at the University of Washington that leverages this program as a credit-earning course
- Replicable model of effective STEM professional engagement in K-12 programming that can be scaled to MESA programs in other states (currently, there are ten states with statewide K-12 MESA programs)
- Model effective structures of scale and continued commitment of teachers and their districts through existing system-level professional development mechanisms
- Leverage ready networks of practitioners to adopt the program through STEM Networks, MESA, and 100Kin10 partners

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## SUSTAINABILITY OVER THREE YEARS AND BEYOND

- Alignment with and leverage of other models of professional engagement in classrooms, such as virtual platforms and networks of engineering volunteers
- On track to achieve sustainability through a shift of state and district professional development funding toward this type of effective programming and related policy and advocacy work
- Broad awareness about the program among Washington industries and companies as well a willingness to support and advance the work in partnership with Washington STEM and Washington MESA
- Innovative exploration of other ready volunteer networks such as retired engineers, returning veterans, and VISTA volunteers