

NASA Glenn Research Center - Office of Education
Engineering Design Challenge: *Powered and Pumped Up* - Winter 2018-2019
Funding Solicitation

Date Application Posted: October 12, 2018
Solicitation URL: <https://www.nasa.gov/Glenn-EDC-winter2018solicitation>
Application URL: <https://tinyurl.com/NASA-Glenn-EDC-Solicitation>
Application Receipt Deadline: November 9, 2018, 11:59 p.m. Eastern Time

Pre-workshop webinar sessions: December 4 and 5, 2018 at 4:00-5:30 Eastern
In-person training session: December 11, 2018

OST Implementation Window: December 1, 2018 - March 31, 2019
Student Presentation Deadline: March 31, 2019
Final Report Deadline: April 14, 2019

PROJECT OVERVIEW

FUNDING OPPORTUNITY DESCRIPTION

NASA Glenn's Office of Education has an interest in engaging local, regional, and national audiences to achieve the Agency's science, technology, engineering and mathematics (STEM) education goals. Goals include advancement of the Nation's STEM education and workforce pipeline and increasing and enhancing STEM knowledge for students, particularly those currently underrepresented and underserved in STEM education and/or fields. To that end, NASA Glenn seeks to collaborate with out-of-school time (OST) organizations to support OST facilitators in providing the excitement of STEM learning as only NASA can.

The Office of Education is soliciting applications from youth-serving organizations (YSOs) and formal/informal education institutions in NASA Glenn's home state of Ohio. This solicitation is requesting proposals to implement STEM content in out-of-school time (OST) settings for students in grades 6-8 from December 1, 2018 through March 31, 2019 using the NASA Glenn Engineering Design Challenge (EDC): *Powered and Pumped Up*. This challenge provides students the opportunity to work on real-world problems in a collaborative, team-based environment. Students apply lessons learned to solve problems that STEM professionals face while gaining a deeper knowledge of how NASA is a part of their everyday lives.

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Funding will be awarded through a competitive application process in which NASA Glenn seeks to fund up to 30 awards each between \$250 and \$500. Based on available funding, Paragon TEC, the Education Support Services contractor for the NASA Glenn Office of Education, may elect to make full or partial awards based on proposals received. This opportunity is designed to provide organizations with:

- Travel funding to attend a mandatory one-day facilitator training workshop
 - Funding will be provided to offset travel costs for one or more facilitators to attend NASA OST facilitator training.
 - Organizations will propose one or more facilitators, based on proposed number of student participants, to attend a workshop hosted at the NASA Glenn Research Center. Proposing organizations should consider reasonable OST facilitator-to-student ratios when proposing number of facilitators to be trained.
 - Travel funding is based on distance between the organization's stated address and NASA Glenn Research Center in Cleveland, OH.
 - Beyond 50 miles - \$250.00
 - Within 50 miles - no travel funds
- Funding to cover materials and supplies needed to implement EDC content.
 - Funding will be provided prior to implementation at \$10.00 per student for activity materials cost.
 - Organizations will propose a number of students, minimum of 20, to fully participate in the EDC content at their location.

The total funds including the travel and student materials above are not to exceed \$500.00.

- EDC activity content aligned to Next Generation Science Standards
- Help-desk support to assist educators as needed in facilitating the EDC
- Opportunities for live web-based connections with NASA scientists and engineers

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BACKGROUND

ELEMENTS OF A QUALITY OUT-OF-SCHOOL TIME STEM PROGRAM

These opportunities will be offered to organizations and programs that indicate the greatest potential to offer high-quality OST STEM programs utilizing evidence-based best practices. Consideration will also be given to organizations who have not previously offered STEM learning experiences but would benefit from the support that NASA content and professional development could provide.

Leading research indicates that quality OST STEM programs should include learner-centered, participatory activities that provide opportunities for participants to engage in STEM practices, explore their interests, and identify with STEM professionals. Activities should reflect the nature of OST STEM program learning environments by providing opportunities for choice, autonomy, ownership, active involvement, wonder, and discovery. Activities should be age appropriate, varied, interesting, enjoyable, challenging, connected to real work, and be flexible (Fredricks, 2011; Graves, 2016; Kesidou & Koppal, 2004; PEAR, 2016; Stocklmayer, Rennie, & Gilbert, 2010). The EDC content was developed to align to these best-practices and support organizations that are equipped to provide high-quality OST STEM programming. Additional information on current research related to quality OST STEM learning can be found at the National Research Council's, [*Identifying Supporting Productive STEM Programs in Out-of-School Settings*](#).

NASA GLENN ENGINEERING DESIGN CHALLENGE: *Powered and Pumped Up*

Using the Engineering Design Process, students will design, build, and improve a stand-alone solar-powered pumping system to move water as quickly as possible between two containers. Students will use light-concentrating materials, shapes, and structures to maximize the collection of simulated solar energy. The energy will then be directed toward a solar cell that will power the system to move water. Students use Science Supporting Investigations to better understand the science behind light and its effect on solar cells. Students will then submit their final solution through a short video or capstone presentation document.

Powered and Pumped Up can be viewed at

<https://www.nasa.gov/glenn-edcs-powered-and-pumped-up/>.

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NASA OST CONTENT SUMMARY

Module	Next Generation Science Standards Content Focus	Synopsis
Engineering Design Challenge: <i>Powered and Pumped Up</i>	Engineering and Physical Science	Using the Engineering Design Process, students will design, build, and improve a stand-alone, solar-powered pumping system to move water as quickly as possible.

NASA INFORMAL EDUCATION

NASA Informal Education seeks to enhance the capabilities of individuals and informal education communities. It provides access to NASA staff, research, technology, information and facilities; offers professional development opportunities for informal science educators; and facilitates collaborative partnerships between the informal and formal education communities. The ability of informal education outlets to engage individuals in STEM fields promotes the advancement of a well-trained workforce.

NASA EDUCATION

NASA's education program strives to "inspire and motivate students to pursue careers in science, technology, engineering, and mathematics" by supporting education in the Nation's schools and to "engage the public in shaping and sharing the experience of exploration and discovery" by supporting informal education and public outreach efforts. NASA's commitment to education places special emphasis on these goals by increasing elementary and secondary education participation in NASA projects; enhancing higher education capability in STEM disciplines; increasing participation by underrepresented and underserved communities; expanding e-Education; and expanding NASA's participation with the informal education community.

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BENEFITS FOR PARTICIPATING ORGANIZATIONS

FUNDING

Awarded YSOs will receive funding for materials costs at a rate of \$10.00 per student participant to implement NASA Glenn EDC STEM content. Organizations can have an unlimited number of students participate in each program; however, total funding for student materials and travel costs will not exceed \$500.00. Funding will be provided prior to implementation at \$10.00 per student for activity materials cost.

TRAINING

Facilitators or staff trainers will be provided a mandatory one-day training session at NASA Glenn Research Center in Cleveland, OH. Funding will be provided to offset travel costs for one or more facilitators to attend NASA OST facilitator training.

- Organizations will propose one or more facilitators, based on proposed number of student participants, to attend a workshop hosted at the NASA Glenn Research Center. Proposing organizations should consider reasonable OST facilitator-to-student ratios when proposing number of facilitators to be trained.
- Travel funding breakdown is based on distance between the organization's stated address and NASA Glenn Research Center in Cleveland, OH.
 - Beyond 50 miles - \$250.00
 - Within 50 miles - no travel funds

Workshops will consist of one full day and will occur on December 11, 2018.

Awarded organizations will confirm their workshop attendance upon notification of award.

- Prior to attending the in-person workshop, attendees will be asked to participate in 2 90-minute pre-workshop webinar sessions focusing on setting a baseline and common vernacular for key aspects of quality STEM programming and use of planning tools to focus and enhance content delivery techniques. These webinar sessions will occur on December 4 and 5, 2018 at 4:00-5:30 Eastern.
- Sessions during the in-person workshop will focus on the EDC content while reflecting on the pre-workshop webinar content. Participants will have the opportunity to work through the EDC activities to gain knowledge on execution of activities, STEM learning background information and delivery techniques.

Awardees will also have access to EDC web-based training sessions during the implementation period.

IMPLEMENTATION SUPPORT FROM NASA EXPERTS

Awardees will receive support throughout implementation via email and phone conferences from NASA education specialists. Sites can request specific web-based facilitator training sessions as needed. As a collaborating organization with NASA Glenn, NASA scientists and engineers can talk directly with students via web-based platform to discuss the scientific and engineering concepts related to the EDC content and their STEM careers.

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ELIGIBILITY REQUIREMENTS

NASA Glenn is seeking:

- Organizations located in Ohio.
- Organizations that will reach students in 6th to 8th grade. Greater consideration is given to organizations who are able to reach underrepresented and underserved students. For purposes of this solicitation, groups underrepresented in STEM fields include Hispanics and Latinos, African Americans, American Indians, Alaska Natives, Native Hawaiians and Pacific Islanders, the economically disadvantaged, people with disabilities, and women and girls.
- Organizations that will facilitate at least 8-10 hours to conduct the entire *Powered and Pumped Up* EDC during the timeframe of December 1, 2018 through March 31, 2019.
- Organizations that will reach 20 or more students to provide the required STEM content. Organizations with greater student reach are highly desirable.
- Organizations who are committed to providing their staff with professional development opportunities, including the mandatory webinar and in-person training sessions

The proposed program must:

- Serve students in grades 6-8.
- Provide all proposed students with the EDC content including submitting student solution presentations.
- Be conducted during the implementation period of December 1, 2018 through March 31, 2019.

Selected organizations must agree to the following:

- One or more designated facilitators must participate in the in-person training session at NASA Glenn Research Center in Cleveland, OH.
- Organizations must complete the content with the number of students proposed in the application. Groups of up to four students work through the iterative Engineering Design Process to build a solution to the given problem. Each group must present their work completed through the engineering design process and their final solution in the form of a 5-minute video or a slide presentation submitted to NASA. Details for the *Powered and Pumped Up* Challenge are at:

<https://www.nasa.gov/glenn-edcs-powered-and-pumped-up>

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Evaluation Requirements:

All awarded organizations must provide a final data report. Details and reporting template will be provided to awarded organizations. The final data report must include the following:

- A brief narrative of the implementation of the activities with the students
- Student and facilitator participation data (anonymized)
 - Number of students (by each grade level)
 - Number of educators/facilitators (certified teachers, pre-service teachers, informal educators)
 - Demographic data (gender, ethnicity, and race)
- Model of implementation
 - When did the program take place (after school every day, half-days on Saturday, etc.)?
 - How were NASA content activities used?
 - When did virtual connections with NASA scientists and engineers occur?
- Signed budget summary
- Stories, images and media release forms of all participants whose likenesses are featured
- Any partnerships and/or collaboration data pertaining to the NASA content implementation

Selected sites may be asked to participate in one or more of the following evaluation activities to help improve NASA's OST programming opportunities. By applying, your organization agrees to participate in the following:

- Complete facilitator surveys
- Participate in focus groups between NASA evaluators and site facilitators
- Have students complete participation surveys

SUBMITTING YOUR APPLICATION

All applications are to be submitted through the online application form which is located at: <https://tinyurl.com/NASA-Glenn-EDC-Solicitation>. Applications must be submitted by 11:59 PM Eastern on November 9, 2018. Applications must be submitted completely at the time of submission, so it is encouraged to prepare responses prior to beginning online application. [A list of the application questions for reference are available here](#). Only applications submitted online will be accepted.

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APPLICATION REVIEW PROCESS

Applications are reviewed by a panel of experts. Full or partial awards may be granted. Award funds are distributed after participation in the in-person training session.

Applications will be evaluated to determine they meet solicitation requirements for the following criteria:

- Number of student participants
- Number of content hours
- Percent of underrepresented students as defined in the application
- Ability to recruit and sustain student participation in the program
- Status as previous NASA partner: past successful participation and plans to engage different participants
- Ability to demonstrate likelihood for quality STEM programming

AWARD ADMINISTRATION INFORMATION

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POINTS OF CONTACT

If you have questions about the project or the application, contact:
NASA Glenn Research Center Office of Education
GRC-Ed-Opportunities@mail.nasa.gov
Chris Hartenstine at: 216-433-2755

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