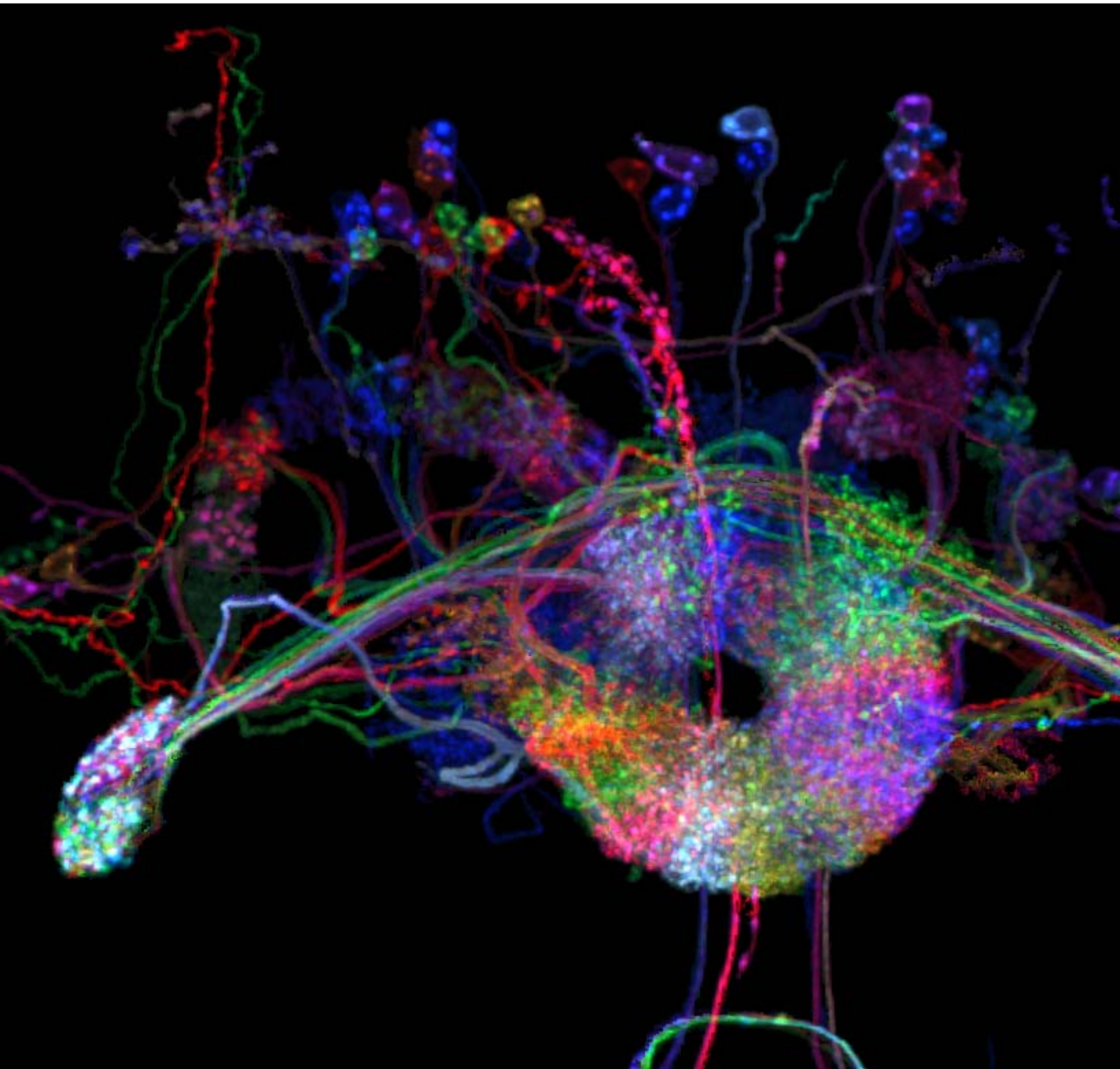
Inclusive Excellence

Engaging all students in science

hhmi | Howard Hughes Medical Institute



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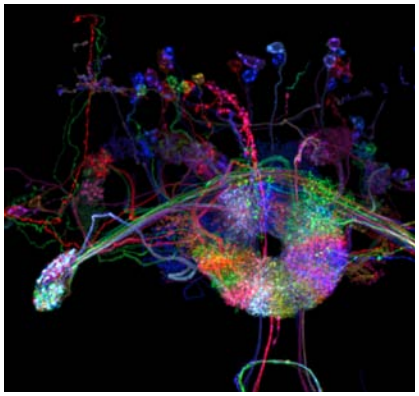
The Howard Hughes Medical Institute announces a new competition for science education grants to colleges and universities. The goal of this initiative is to help institutions build their capacity to effectively engage all students in science throughout their undergraduate years, especially those who come to college via nontraditional pathways. HHMI expects to make up to 60 awards of up to $1 million each over five years.



Cover: Converging neurons in the central region of a Drosophila brain visualized using a method that stochastically labels cells. Cell bodies, inputs, and outputs of several different cell types are highlighted. (Wolff, T., Iyer, N.A., and Rubin, G.M., 2015. J. Comp. Neurol. 523: 997-1037)

For in that same era, the 1970s, higher education was opening its doors wider than ever before. The academy had begun to admit—indeed, to seek out—whole new groups of students: adult students, students of color, first-generation students, international immigrant students, students from less advantaged families, students who were working full time and attending part time. Today, what were then called 'nontraditional students' are, collectively, the ***new majority*** *[emphasis added] in higher education.*

—CAROL GEARY SCHNEIDER

Making Excellence Inclusive: Liberal Education and America's Promise, AAC&U, 2005

Our Objective

The objective of this initiative is to increase institutional capacity for inclusion of students from all backgrounds in science. Institutions of higher education that aspire to lead in the 21st century must effectively engage all students, especially the increasing number of students who come to college through "nontraditional" pathways. Through this initiative, HHMI will support colleges and universities that commit to measurably increasing their infrastructure, resources, and expertise to involve undergraduate students in science, resulting in expanded access to excellence for all students and especially those who belong to the "new majority" in American higher education. Our long-term aim is for successful strategies pioneered by the grantee institutions to serve as models to be adapted and adopted by other institutions.

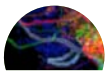
We seek to catalyze the creation of lasting institutional capacity that will benefit all students well beyond the lifetime of the HHMI grant. By establishing practices and policies that ensure that students from nontraditional pathways can be successful, all students will benefit. An HHMI grant awarded through this competition will help the grantee institution achieve the following outcomes:

- The institution clearly demonstrates that it values efforts to expand access to and achievement in science by all students.
- The institution applies effective evidence-based teaching and learning practices across its science curriculum and for all students.
- All students, especially students from the "new majority," have the opportunity to excel, complete the baccalaureate degree, and continue in science beyond the baccalaureate degree.
- During the lifetime of the grant, the institution expands the project leadership team by increasing participation of faculty, including tenure-track and tenured faculty.
- The institution provides faculty with opportunities to develop the skills needed to work effectively with nontraditional students and to contribute to the program.
- The institution effectively uses program assessment that is systematic, ongoing, and informs improvements.

The Challenge

Widespread and effective science literacy is necessary for the development of future scientists, and it is the best way to build a society whose citizens will be prepared to engage in evidence-based dialogue and are empowered in a world dependent on science and technology. Thus, it is important that all students have the opportunity to participate in science in a meaningful way. The undergraduate years are a critical period during which a large number of students begin to develop scientific thinking skills in an organized fashion. It is an ideal time to develop the potential of future scientists and increase scientific literacy of all citizens.

The opportunity is large: every year in the United States, about 40 percent of freshmen (more than 1.5 million students) enter college planning to study science, technology, engineering, and mathematics (STEM). The opportunity is also short-lived: before they have completed the sophomore year, most of these students switch to non-STEM disciplines. Providing an effective science education



watershed

noun wa·ter·shed \'w'-t'r-'shed, 'wä-

1. the area of land that includes a particular river or lake and all the rivers, streams, etc., that flow into it

2. a time when an important change happens

–Merriam-Webster Dictionary

experience is further complicated by the dynamic demographics of the nation's talent pool. A large number of today's students are arriving at college through remarkably diverse pathways. Rather than "pipeline," today's metaphor is "watershed," in which students, traveling along different tributaries, converge in college.

Two important populations of the science education watershed are transfer students, who complete portions of their introductory coursework at community colleges or regional campuses, and first-generation students, who are the first in their family to attend college. Half of all of today's STEM baccalaureates and one-fifth of STEM PhDs attended community college at some point in their undergraduate education. Nearly one-fourth of all undergraduates are first-generation students, and half of all first-generation students begin in community college. Ethnic "minorities," which will soon be the majority, and persons from economically disadvantaged backgrounds are significantly overrepresented among transfer and first-generation students.

Although transfer and first-generation students are an important part of the undergraduate talent pool, the current educational system is inadequate in enabling their success. The six-year baccalaureate completion rate is 58 percent for students who begin college at a four-year institution but only 11 percent for those who begin at a two-year school. In a longitudinal study of a large cohort of students from 1992 to 2000, the baccalaureate attainment rate was 68 percent for students whose parents had a baccalaureate degree but only 24 percent for first-generation students (see Figures 1 and 2).

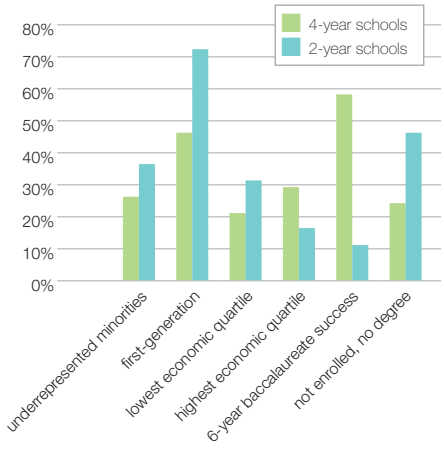


Figure 1. Characteristics of undergraduates who enter college at 4-year schools (green) and 2-year schools (blue). Half of all undergraduates begin at 2-year institutions. Students who begin at a community college are more likely to be underrepresented minorities, first-generation, and from the lowest economic quartile. There is a nearly sixfold-greater probability for successful completion of the baccalaureate in all disciplines among students who begin at 4-year institutions. *Data from Skomsvold et al., 2011.*

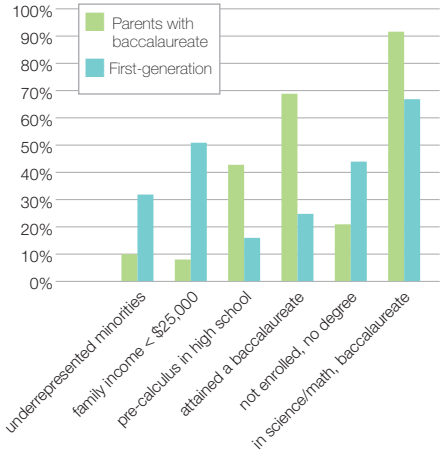
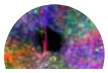


Figure 2. Characteristics of undergraduates with a parent who earned a baccalaureate degree (green) and undergraduates who are first-generation students (blue). First-generation students are more likely to be underrepresented minorities and from a poor background and are also more likely to have attended a high school where pre-calculus (or higher) was not offered. There is a nearly threefold-greater probability of attaining the baccalaureate degree for students whose parents have a baccalaureate degree. For students majoring in science and math, first-generation students have a lower success rate. Data are from a longitudinal study of students from 1992 to 2000 *(Chen and Carroll, 2005).*



"There was a time when most people who attended college were single white men, had high school diplomas, started college at age 18, graduated in four years, had all the academic preparation needed to succeed, and had few family responsibilities. In the 21st century, this is not true. Today, students come from diverse backgrounds, have widely divergent levels of preparation, may be returning to college after years in the workforce or serving in the U.S. military, and often are employed while in college to support themselves and families. Higher education needs to acknowledge these differences among students and work to accommodate them by creating more entry points and pathways to STEM degrees. At the beginning of the 21st Century, the concept of a "pipeline" to STEM competency and accomplishment needs to be replaced by a system of multiple pathways to these goals."

PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY

–Engage to Excel, 2012

The diversity of people and pathways presents new and significant challenges for colleges and universities in providing their students with a compelling science education. In what ways can an institution provide all beginning students—including those who were previously at a community college, those who are returning to college, or those for whom college is a brand-new family experience—with the learning opportunities that have been shown to work, including active learning in the classroom, research experiences, and a support system of advising and mentoring? How can an institution identify the potential and develop the talent in all students to ensure that their success in science is not limited by barriers that exist simply because they started at a different entry point? How can faculty contribute to improving the campus climate and empower students to excel in the sciences? How can colleges and universities cultivate the necessary institutional resources, infrastructure, expertise, and cultural competencies to achieve inclusive excellence?

Characteristics of Inclusive Excellence

Addressing these challenges requires more than the efforts of a few individuals who implement an isolated initiative; instead, a collective approach by multiple stakeholders across a campus is necessary to achieve lasting change. A successful strategy will be grounded in a baseline measure of how students from nontraditional pathways are currently progressing in science; an understanding of the barriers that limit students' opportunities to excel in the sciences; and an aspirational vision shared by the faculty, administrators, and staff.

Improving institutional capacity to engage all undergraduate students in science and support their success should leverage activities already underway on campus and build upon what the institution is learning from them. Colleges and universities should work to understand the characteristics and dynamics of the students who are new to their science programs, explore the current climate for inclusion in their departments and classrooms, and deploy evidence-based approaches to improve student experiences. Over the five-year period, grantee institutions will use formative assessment to adapt their strategies and use findings that emerge from program evaluation as opportunities for organizational learning. These colleges and universities have the potential to learn how institutions can establish their own capacity to meaningfully engage and support all students. It is through these collective efforts that we will achieve inclusive excellence in science.

The Competition

HHMI plans to award approximately 60 grants in two competitions, each of which will follow the same format. The first competition will result in approximately 30 awards that will be made in September 2017. We expect the second competition to be announced in 2016, with awards to be made in September 2018. We expect that each grant will be for five years and total $1 million. We do not plan to offer renewals of these awards.

HHMI invites pre-proposals from eligible institutions. The focus of the proposed work should be on engaging all undergraduate students in science and supporting their success, especially those students who come to college via nontraditional

pathways. Projects may include disciplines outside of the natural sciences, but the natural sciences should be central to the proposed activities.

To be eligible for this competition, **all** of the following conditions must be met:

1. The school is one of the 1,500 not-for-profit, four-year institutions identified by the 2010 Carnegie Foundation for the Advancement of Teaching's Basic Classification (http://carnegieclassifications.iu.edu/descriptions/basic.php) as (i) Baccalaureate Colleges—Arts and Sciences, (ii) Baccalaureate Colleges—Diverse Fields, (iii) Baccalaureate/Associate's Colleges, (iv) Master's Colleges and Universities—larger, medium, and smaller programs, (v) Doctoral/Research Universities, (vi) Research Universities—high research activity, (vii) Research Universities—very high research activity, and (viii) Tribal Colleges. This list will be accessed through the "Intent to Apply" step.
2. The school offers four-year baccalaureate degrees in the natural sciences or offers a single baccalaureate degree that is inclusive of the natural sciences.
3. The school is accredited and in good standing with the appropriate regional accrediting organization.

Ineligible institutions include Associate's Colleges and Special Focus Institutions (Carnegie Basic Classification) and the 40 research universities awarded 2014 HHMI institutional science education grants.

An eligible institution is limited to one pre-proposal in one of two categories:

- **Building Capacity Within the Institution** is for colleges and universities that will use and evaluate strategies to build their own institutional capacities.
- **Helping Others Build Capacity** is for those institutions that have already implemented sustainable strategies that have led to measurably expanded inclusion and success of all students in science and now wish to assist other institutions that meet the eligibility requirements for this competition to achieve similar outcomes.

Pre-proposal and Timeline

An institution interested in participating in the competition will submit a pre-proposal that includes the following information: (i) the context and rationale for the population of students on which the proposed activities will focus; (ii) the anticipated changes in institutional capacity that will result from the grant; (iii) the people who will lead the project and their qualifications; and (iv) the process by which the institution will prepare the full proposal, should it be invited.

Each institution intending to submit a pre-proposal must select an Institutional Representative (IR) to serve as the point of contact for the pre-proposal. The IR must be a tenured faculty member, part of the core leadership team, and designated by an Authorizing Official, who has decision-making authority at the dean level or above. The Authorizing Official cannot be the same person as the Institutional Representative.

In order to receive a link to the pre-proposal application, an institution must **complete the online Intent to Apply form prior to July 14, 2015**. The Intent to Apply form may be submitted only by a school that meets all three conditions of eligibility. Only one pre-proposal from each eligible institution is permitted.

After the Intent to Apply form is submitted, the IR will receive an email in mid-July with login and password information and instructions for completing the pre-proposal.

The pre-proposal will be due December 1, 2015, 2:00 p.m. (ET).

The pre-proposals will be reviewed by experts in science and science education whose advice will result in the selection of institutions that will be invited to submit full proposals. If an institution is eligible for the 2017 competition and submits a pre-proposal but is not selected to submit a full proposal, that institution will have the opportunity to submit a revised pre-proposal for the second competition, in 2018.

Key dates for the 2017 competition:

- Intent to Apply form submission deadline: July 14, 2015
- Pre-proposal application available: July 16, 2015
- Pre-proposal deadline: December 1, 2015
- Invitation to submit full proposals: May 2016
- Full proposal deadline: October 2016
- Announcement of awards: May 2017
- First-year payment: September 2017

For more information and to access the Intent to Apply online form, please visit: http://www.hhmi.org/programs/undergraduate-science-education-grants

For inquires, please contact: 2017ugradcomp@hhmi.org

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