

Catalyst Awards for Science Advancement (CASA): Pilot Results

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Abstract

Catalyst Awards for Science Advancement (CASA) are mini-grants designed to promote professional development for graduate students, post-doctoral researchers and early career scientists. Professional development is embedded into CASA in multiple ways: writing the proposal, executing the proposed activities, preparing the final report, and optionally, serving as a CASA peer reviewer. Proposals are solicited semi-annually. Thirty-five projects have been awarded to date, including 16 during Round 1 (Spring 2024) and 19 during Round 2 (Fall 2024). Following submission of their final reports, project leads are invited to complete an anonymous evaluation survey. To date, 27 (or 77%) project leads completed the survey. Pilot evaluation results are strongly positive. On a scale of 1 (negative) to 5 (positive), participant mean responses to 17 quantitative survey items regarding self-efficacy, sense of belonging and agency range from 3.9 to 4.8. Qualitative (open-ended) responses align with the quantitative results. Formative feedback is used to inform program revisions for future solicitations. For more information: www.soest.hawaii.edu/CASA/

Keywords: Professional Development; Grant writing; Graduate students; Early Career

1. Introduction

1.1. Rationale & Institutional Context

This pilot program is co-located at two institutions in the United States (U.S.): University of Hawai'i at Mānoa (UH Mānoa), located in Honolulu, Hawai'i, and Washington University at St. Louis (WashU) in St. Louis, Missouri. Both UH Mānoa and WashU have a Carnegie Classification of R1, defined as doctoral-granting universities with very high research activity (American Council on Education, 2025). Only a small portion of research activities at R1 institutions are supported through intramural sources; the vast majority is supported by U.S. federal agencies, such as National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Oceanic and Atmospheric Administration (NOAA), National Institute of Health (NIH), Department of Defense (DOD) and

Department of Energy (DOE). Typically, these federal agencies issue solicitations (requests for proposals), faculty submit proposals, peer reviewers evaluate the scientific merit of the proposals, and (based on that evaluation) funding is either awarded or denied. Thus, the ability to secure extramural funding is a major determinant of a scientist's research productivity. Yet, few graduate programs offer training in grantsmanship (grant writing and/or grant management). And, when such trainings are offered, they are typically optional and often conflict with class or work responsibilities. Thus, attending such training is rarely prioritized by students or their advisors. The result is that many newly minted PhDs have little or no grantsmanship training or experience, which puts them at a significant disadvantage career-wise, particularly if they land at an R1 institution.

1.2. CASA Program & Professional Development

Catalyst Awards for Science Advancement (CASA) offers mini-grants (up to \$3000) to promote grantsmanship and other types of professional development among graduate students, post-doctoral researchers and other early career scientists (e.g., university faculty or staff). This program extends to two main groups: (1) UH Mānoa's School of Ocean and Earth Science and Technology (SOEST), which supports research and training in earth, ocean, atmospheric and planetary science; and (2) Interdisciplinary Consortium for Evaluating Volatile Origins (ICE-Five-O), a multi-institutional NASA Solar System Exploration Research Virtual Institute center that researches volatile evolution on airless bodies like the Moon and asteroids. Led from WashU, the ICE-Five-O team also includes researchers from SOEST and other institutions in the U.S. and Canada.

Professional development is embedded into CASA in multiple ways: through writing the proposal, adhering to program requirements, responding to peer reviews, executing the proposed activities, developing and managing the project budget, preparing the final report, and optionally, serving as a CASA peer reviewer. CASA mini-grant proposals are solicited semi-annually, with submission deadlines in May and December, and eligible SOEST and ICE-Five-O students and scientists apply. Prior to the submission deadline, online and in-person information sessions are offered to clarify guidelines and answer questions. These sessions represent the extent of pre-submission training; the vast majority of professional development training unfolds in a series of scaffolded steps following submission (summarized below). At each step of the process, staff are available to support project leads.

- 1) Peer review panels are convened and panelists are trained in reviewing proposals based on NSF merit review criteria. All persons eligible to serve as a CASA project lead may volunteer to serve as a peer reviewer, provided they are not submitting a proposal during that round of funding. Typically, each panelist is asked to review 4-6 proposals over a two-week period using a template provided. Usually, three panelists are assigned to each proposal, and they write their reviews independently. This serves to increase the quality

and independence of the review process and avoids putting undue pressure on the peer reviewers.

- 2) Peer reviews are then compiled into a summary review containing two parts: strengths and weaknesses / areas that require clarification, and these reviews are sent to the project lead. Based on this summary, a small number of proposals are selected for or declined funding. However, in most cases, the proposal is considered selectable and the project lead is asked to respond to the review (e.g., provide additional information not included in the original proposal to address weaknesses). The revised proposal is then re-considered for funding. This unusual two-stage review process is intentionally designed to increase the quality of the final proposal submitted and therefore the likelihood of funding, which is anticipated to result in increased self-efficacy. A key result is the vast majority of CASA proposals are funded. The peer review experience also trains the peer reviewers to write stronger proposals in the future.
- 3) Project leads of successful proposals now begin their project, which are executed over a period of approximately six months. Project periods are February-August (for proposals submitted in December) and July-December (for proposals submitted in May). During this stage, the project lead develops professionally by executing the project activities (e.g., attending a short course, mentoring an undergraduate, organizing an outreach event) and managing the budget.
- 4) After completing the project, project leads submit a brief report, which includes a synthesis of results, dissemination and whether project goals/objectives were achieved. This requirement is modeled after NSF processes.

1.3. Project Goals and Theory of Change

The overarching goal of the CASA program is to promote professional development for graduate students, post-doctoral researchers and early career scientists. Beyond improved grant-writing skills, anticipated outcomes include increased sense of belonging, self-efficacy and agency, so project leads feel empowered to pursue future, larger grants. Self-efficacy theory states that a person's belief in their own capabilities affects their behavior (Bandura, 1977). Simply put, increased self-efficacy leads to increased motivation, engagement, effort and persistence, which in turn leads to increased competence. Research has shown that a sense of self-efficacy, belonging, and agency positively correlate with academic achievement, retention and career success (e.g., Bandura, 1986; Elliott & Dweck, 2988; Pintrich & DeGroot 1990; Schunk 1983a, 1989a).

CASA invokes two theories of change: scientific management and social cognition (Kezar, 2018). A top-down scientific management approach is utilized through the establishment of a new funding program to incentivize change. A bottom-up social cognition change perspective

is invoked through the individual CASA awards. The project leads are a key part of the change because these individuals are proposing, leading and managing the project activities. Thus, the CASA program provides a framework for top-down and bottom-up theories of change to merge.

2. Methods & Data

2.1. Survey Instrument

Following completion of their project and submission of their final report, project leads are invited to complete an anonymous online survey, which was approved as exempt by the UH Institutional Review Board. This survey contains 24 items, divided for the purpose of this discussion into three sections and takes approximately 5 minutes to complete. Part 1 (3 items) asks for the project lead's academic status and past experience with submitting proposals and being awarded grants. Part 2 (17 items) aims to evaluate whether CASA participation results in increased self-efficacy, sense of belonging, and/or agency among project leads. The first subsection (self-efficacy) presents a list of 11 skill sets. For each, project leads are asked to compare their current level of knowledge/confidence to their pre-CASA level. The second subsection (sense of belonging; 3 survey items) asks project leads to report on any changes in their feelings of connection and happiness at work, as a result of having received a CASA award. The third subsection (agency; 3 survey items) asks project leads to estimate their likelihood of participating in future grant-related opportunities. In Part 2, all survey items are given in the form of statements and survey respondents are asked to indicate their level of agreement with each. Response choices range from Strongly Disagree to Strongly Agree, as well as "Not Applicable". Part 3 (4 items) solicits formative feedback to inform program revision. Through open-ended prompts, project leads are asked to share one thing they liked about being a CASA project lead, one thing they learned, and a suggestion for program improvement. There was also a space provided for optional, additional comments.

2.2. Survey Data & Analysis

Thirty-five CASA projects have been awarded to date, including 16 during Round 1 (Spring 2024) and 19 during Round 2 (Fall 2024). To date, 27 project leads have completed the survey, for a response rate of 77%. Data are summarized below.

Survey Part 1. Academic Status & Prior Grant Experience

The majority (52%) of survey respondents are graduate students; the others are university faculty or staff (37%) and post-doctoral researchers (11%). About one-third (35%) of respondents had submitted at least one proposal prior to CASA, although fewer than one-third (27%) had received at least one successful funding decision.

Survey Part 2. Self Efficacy, Belonging and Agency

For each survey item in Part 2, respondents indicate their agreement or disagreement on a five-point Likert scale. The response choices are then quantified as follows: 1 (Strongly Disagree); 2 (Disagree); 3 (Neither Agree nor Disagree); 4 (Agree); and 5 (Strongly Agree). Responses of “Not Applicable” are neither quantified nor included in the analysis. **Table 1** presents the self-efficacy survey items, along with the mean response and the % agreement (that is, the percentage of respondents who agreed or strongly agreed) to each. Similarly, **Tables 2 and 3** present the survey items on sense of belonging and agency, respectively, along with the mean response and % agreement.

Table 1. Participant Responses to CASA Survey items on Self-Efficacy

Compared to how I felt before I applied for my first CASA mini-grant, I now feel more knowledgeable / confident in	Mean Response¹	% Agree²
Justifying the importance of a project	4.3	89%
Organizing project ideas / activities in writing	4.4	89%
Creating and managing a budget	4.4	93%
Writing a competitive proposal	4.4	93%
Asking colleagues for feedback	4.0	70%
Conversing with funders about my project ideas	4.1	78%
Responding to peer reviews	4.2	85%
Executing project activities that I proposed	4.4	89%
Writing a final report	4.4	93%
My writing abilities, in general	3.9	63%
My scientific abilities, in general	3.9	65%

¹Mean Response is on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree)

²% Agree is the percentage of respondents who selected “Agree” or “Strongly Agree” responses

Table 2. Participant Responses to CASA Survey items on Sense of Belonging

As a result of having been awarded a CASA mini-grant, I now feel ...	Mean Response¹	% Agree²
More connected to SOEST peers / colleagues	4.4	85%
More respected by my peers / colleagues	3.9	67%
Happier about my work	4.6	93%

¹Mean Response is on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree)

²% Agree is the percentage of respondents who selected “Agree” or “Strongly Agree” responses

Table 3. Participant Responses to CASA Survey items on Agency

As a result of having been awarded a CASA mini-grant, I am now more likely...	Mean Response¹	% Agree²
To apply for another mini-grant opportunity	4.8	100%
To apply for a larger grant	4.6	89%
To volunteer to serve as a peer reviewer for a grant competition	4.4	85%

¹Mean Response is on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree)

²% Agree is the percentage of respondents who selected “Agree” or “Strongly Agree” responses

Part 3. Formative Feedback

Respondents are invited to provide responses to open-ended prompts to share one thing they liked about being a CASA project lead, one thing they learned, and a suggestion for program improvement. Space is also provided for optional, additional comments. **Table 4** presents a sample of representative responses received regarding what they liked and learned. The suggestions they offered included making successful past proposals available (to serve as examples), increased advertising (to ensure all students are made aware of CASA), an extended project period (to allow more time to spend down the budget), and meetings with other project leads (to foster networking). The optional comments shared were all expressions of gratitude.

3. Discussion & Conclusions

Pilot results were strongly positive. On a scale of 1 to 5, participant mean responses to the 17 quantified Likert scale survey items ranged from 3.9 (Agree) to 4.8 (Strongly Agree) (**Tables 1-3**). We note that all survey items were worded such that agreement is a positive response. Participant agreement rates (the percentage of respondents who agreed or strongly agreed with

Table 4: Sample participant responses to open-ended prompts

Please share one thing you <i>LIKED</i> about being a CASA project lead	Please share one thing you <i>LEARNED</i> from being a CASA project lead
<p>Bringing an idea to fruition. I really appreciated the opportunity to come up with a project, propose it, receive funding, and actually do it!</p>	<p>I learned how to organize an original idea and have a set list of goals.</p>
<p>I liked being the PI of my own project (often not possible as a PhD student).</p>	<p>Everything takes more time than anticipated. All aspects of my proposed work took longer than intended and I didn't account for admin tasks like managing receipts and reimbursement and final reporting.</p>
<p>I was able to help find a way to support a project that I am passionate about</p>	<p>I developed soft skills in facilitating symposiums and workshops, including time management, introducing speakers, designing discussion dynamics, and effectively summarizing discussions.</p>
<p>I liked to be able to run the symposium I applied for. It had great attendance and was very well received by the participants.</p>	<p>I learned the importance of dissemination.</p>
<p>I liked being in charge of communication with the grantors.</p>	<p>I was able to work with managing grant spending and ordering for the first time, which will be very helpful for future endeavors.</p>
<p>I have never applied for a grant before and the process was very straightforward and gave me the confidence to try applying to more small grants.</p>	<p>Budget needs to be more well thought out. I believe we had quite a bit left over. If planned better, we could have been more efficient.</p>
<p>CASA allowed me to work with students on fun and engaging projects, and with the inclusion of a stipend for student support, I was able to support them financially as well as intellectually.</p>	<p>Gained valuable experience in managing a project of this scale, particularly the timing of putting events together.</p>
<p>Being a CASA project lead allowed me to investigate the issues my community partners and I agreed upon without being limited by funding or the priorities of other project leads.</p>	<p>The two-stage review process (being given an opportunity to address questions posed by the reviewers) was really powerful in that it gave me ideas about what I could include in future proposals to make an application/ justification stronger.</p>
<p>Being able to work on collaborations outside my lab bubble and help inspire early career scientists! The CASA team was also great to work with, flexible on changing situations.</p>	<p>I learned new ways to engage students in and outside the lab and found that student success takes many forms.</p>
	<p>I learned the importance of sharing and delegating tasks effectively, ensuring that responsibilities are distributed in a way that supports both teamwork and efficiency.</p>

each survey item) ranged from 63% to 100%, with a mean of 82%. Project leads reported increased mean self-efficacy in all survey items, even those that were not specific to the CASA project, such as their general writing (3.9) and scientific (3.9) abilities (**Table 1**). They also reported an increased sense of belonging, measured by feelings of connectedness to peers (4.4), being respected by peers (3.9) and happiness at work (4.6) (**Table 2**). In terms of agency (mean responses 4.4 to 4.8), 89% of respondents reported being more likely to apply for a larger grant, 85% to serve as a peer reviewer, and 100% to apply for another mini-grant opportunity (**Table 3**). Responses to open-ended comments asking what they liked and learned (**Table 4**) were similarly positive. For example, respondents reported liking the independence and leadership involved in being project lead, the application process, pursuing new (previously unfunded) opportunities, and working with students and community collaborators. They learned how to organize ideas, set goals, create budgets, manage tasks and spending, make a dissemination plan, in addition to specific skills learned from executing the projects themselves. Together, the qualitative and quantitative pilot evaluation results indicate that serving as a CASA project lead positively impacts self-efficacy, sense of belonging and agency, qualities that have been found to correlate with academic achievement, retention and career success.

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