TIPS AND TRICKS FOR CURRENT AND FUTURE PIS OF REU SITES

Written by the NSF Chemistry REU Leadership Group
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Helpful Hints for Successful REU Sites

1. Expressing expectations is important. Be sure to outline your expectations for the REU students during your orientation meeting. Include specific expectations about the range of hours that a student should work, the flexibility of their time, vacation policies, deliverables at the end of the summer, etc.
2. Organize social activities early and frequently in the program. Social activities that occur in the first few days of the program are most effective in encouraging the students to build friendships.
3. Make sure a desk space is available for each student so that they feel like respected researchers in the program, not just transient visitors.
4. Distribute a calendar of events during your orientation meeting with the students. The calendar of events will convey the level of planning effort that was expended on your REU program, and the students will respond accordingly.
5. Learn the students' names ASAP.
6. Be sure to correspond with the students frequently and regularly prior to their arrival at your institution. Many students are unfamiliar with REU programs and will have numerous questions about the dormitory situation, the meal plan, the dress code, etc. Providing extensive information up front will ease confusion and make them feel welcome.
7. Get your best senior undergraduates or graduate students involved in aspects of the REU program. These students are often your best ambassadors for your institution.
8. To prevent long delays in delivery of the first paychecks, try to complete all of the payroll paperwork prior to the students' arrival.
9. You will need to correspond with the REU students frequently during the program (to send seminar reminders, meeting reminders, etc.), so make sure to obtain good e-mail addresses for all of them.
10. Prior to the arrival at your site, make sure the students have all the relevant information about dorm check-in, travel reimbursement procedures, and the check-out date.
11. To assess whether the REU students are being properly integrated into their research projects and labs, having a session early in the summer in which the students describe their projects via short (three minute) talks is a great way to ensure a successful summer experience for all participants.
12. Consider using a course management program (Blackboard, Moodle, etc) as a central clearinghouse for information for the students. This permits easy information exchange without students trying to track each other down in distributed laboratories. Note that for this to work, you must provide regular new content so that students check it regularly.
13. It is great to take advantage of activities and events taking place across campus, but be sure to have signature REU events that establish the program's identity.

14. Consider subsidizing post-program activities. In particular, group reunions at professional meetings are a great way to advertise your program, while emphasizing to the students the magnitude of their summer accomplishments. Note that these need not be restricted to national ACS meetings. There are other options including regional ACS meetings and specialty meetings that might be appropriate to your site. The NSF-Leadership Group may be able to assist with travel costs in some cases.
15. Meet with all the faculty and graduate student mentors that will interact with the REU students prior to the start of the REU program. Express the expectations of the program, the time-line of the program, and the weekly activities in which the REU students will participate.
16. Follow up with regular check-ups with the faculty and grad student mentors throughout the program.
17. Meet regularly with the REU students, either individually or as a group. Constant mentoring and monitoring is a critical key to a successful REU program.
18. Often your best REU recruiters are former REU students. Maintain regular contact with former REU participants, and they will remain connected to your program.
19. Encourage REU students to attend a regional or national ACS meeting.
20. Establish a contact person (often a faculty member) with each undergraduate program for which you have recruited REU students. This contact person can assist in encouraging former REU students to attend conferences and in maintaining a recruiting pipeline.

Publicizing your REU Site

1. Prepare a colorful flyer summarizing your site and giving your REU Web site address and your e-mail address. Convert this flyer to a PDF file that can be sent to numerous faculty at targeted institutions. Avoid sending flyers in formats that are not universal (Word, Excel, etc.)
2. Attend regional ACS meetings and be prepared to distribute flyers. If there is an undergraduate poster session, attend it and network with undergraduates and faculty.
3. Create your own REU Web site and keep it very updated.
4. Maintain correspondence with your former REU participants and ask them to publicize your program to peers at their institution. Send them your flyer for distribution.

REU Proposal Writing Made Easy

(A Collection of Really Bad Advice)

Writing a successful REU proposal can be difficult, but if you're not so concerned about the outcome, the task can be simplified immensely. Here are some ideas for making sure your efforts at writing a proposal are not complicated by the need for writing a final report at the end of the award!

General *Bad* Advice for Writing NSF Proposals:

1. Ignore the GPG (Grant Proposal Guidelines)- Only losers read the GPG, it's like reading the instruction manual on a new appliance. You already know everything you need to know, how hard can it be?
2. *Be creative on the Project Summary section format- One page isn't nearly enough, so make it as long as you wish. And what's with this Broader Impact stuff anyway? It's the National *Science* Foundation. Addressing the Scientific Merit criteria should be enough, right? That's the important half of the requirement.

5. *The Project Description is where your ideas shine. Don't limit your brilliance to a mere 15 pages. You can also shrink the font and expand the margins so that you can fit in every last bit of wisdom. Reviewers are particularly sympathetic when asked to read proposals with tiny, compressed fonts that show you are exercising your freedom of speech to the maximum. Remember, you are a poet and poets are not bound by the "rules".
6. A picture is worth a thousand words. But there is no reason not to use a thousand words *and* a picture. Keep the pictures really small though. NSF would be remise if they didn't provide reviewers with magnifying glasses to study them. No use wasting valuable text space with legible figures.
7. Forget about getting your colleagues to proof your proposal. They don't have time to read it and all those typos and grammatical errors show how busy and productive you are. Reviewers understand that concise prose and coherency are the mark of people with too much time on their hands.
8. Put in as many citations of your own work as possible. No one will check them anyway and those papers that are "almost submitted" will undoubtedly be finished by the time the reviewers see the proposal, especially those that rely on your collaborators to provide crucial data.
9. Don't waste your time proof reading the PDF files of your final submission. The Fastlane conversion engine is perfect and everything will be just fine. Of course, the likelihood of uploading the wrong version of the proposal is so small it needn't be considered. Push the button and go have a beer.

   * Not only will following these items spare you the burden of being funded, they will also help you avoid the stress of worrying about the proposal as NSF will return it without review.

REU Specific *Bad* Advice

1. Request a copy of a successful proposal from another REU site and then cut and paste the text. If you are uncomfortable with outright plagiarism, just copy the key program components. The details of the REU program never change and what sells a proposal from an R1 school will sell a proposal from a small PUI, regardless of the local demographics, research expertise, and resources.
2. Don't talk to the Program Director, it annoys them and they will just spout the party line without providing you with any useful insights. Your colleague down the hall who was last funded 15 years ago has a far better perspective on how the program really works.
3. And sit on a REU review panel?? Who has time for that? The reviewer panel is composed of people exactly like you with the same perspectives as you. Speaking of which, why are you bothering with the REU Leadership Group website anyway? Nothing to see here …
4. Recruiting is easy. Send out a bunch of letters and the students will flock to your site. Don't worry about a web site or making personal trips to your target schools. Minority-serving institutions are particularly easy to reach, since their students will be honored by your interest. There are no other programs out there for them and the faculty of those institutions will instantly realize that your program has particular merit. Of course, reading about successful programs for reaching underserved populations in this publication would be a waste of time: http://www.cur.org/publications/broadening.html.
5. What does "REU" mean? The undergraduate part is obvious, but research? You can't really expect any valuable results to be generated by undergraduates in a short summer experience. So load your program up with exciting field trips, workshops, and social activities. They can observe real researchers without getting in the way.
6. OK, the last comment was a joke, field trips take a lot of your time and do nothing to promote your own research productivity. Undergraduate students should be in the lab full time working as support staff for the graduate students and post docs. There is a lot of glassware to be washed and routine instrument maintenance to be performed. You can always tack their names on a publication, even if they didn't really contribute.
7. Pad the budget in case you get cut. Take the general per student guideline and add 10%, regardless of your actual costs. Apply for the ethics supplement, even if you don't really intend to do anything special (irony is what these supplements are all about!). Just throw in a few sentences about case studies and you will be fine.
8. Don't feel good about the previous suggestion? Then cut your budget to the bone. Let students worry about their own travel to your site and assume they can find and pay for their own housing. Your mentors are happy to provide supply money for the REU students out of other resources and you can expect the student's home institution to cover any costs for later travel to professional meetings.
9. There is nothing more painful than assessment. What is there to learn anyway? Send out a simple exit questionnaire that encourages the students to tell you they learned a lot and had a good time. That will be good enough for a renewal and may provide a few choice quotes for your web page.

Typical Timeline for Running an REU Program

November	Start getting materials together for mailings to chemistry departments (i.e. publicity materials)
December	Update/prepare flyer, application package, and website
January	Mail package to chemistry departments Post new application materials to your REU web site Start new spread sheet for received applications Setup file for each application
February	Continue to receive applications Make housing arrangements (location dependent) Selection committee starts reviewing packages
March	Selection committee recommendations reviewed Start making offers until class full Check on the cost of parking, dorm room telephones, recreation fees, and other costs
April	Send out rejection letters Mail each participant an information package Make reservations for vans, park, etc. for social events and field trips Make rooms assignments Mail each participant final letter with copy of each participant's roommate information, schedule of activities for the 10 weeks, and map of and directions to site
May	Schedule seminars and activities Make reservation for final luncheon Make photo setting reservation Prepare a file for each participant, advisor and bookkeeper Get each participant setup with e-mail accounts, access to the library, campus, recreational facilities, etc.
June	Participants arrive; begin program
July	Program in progress; start data collection for renewal proposal (if renewal year)
August	Program concludes; final reports filed; renewal proposal submitted
September	Collect information for annual report
October	Annual report submitted

Tips for On-line Application Forms

1. Make the application form easy to navigate. List the steps for completion on each page. (E.g., This is step 1 of 4.)
2. Minimize the amount of text entry for fields. This makes sorting much easier later. (For example, the field for major can be a selection from chemistry, chemistry/pre-med, chemical education, chemistry/pre-pharm. A text entry for major can result in chem, pre-med/chem, chem/pre-med, chem-premed, etc.)
3. Create scripts that automatically send an email with instructions to the individuals indicated for letters of recommendation. Provide a guide for the characteristics that are important for your site (e.g., ability for independent research, plans for a graduate degree, etc.). This will help you identify the most appropriate participants for your site. Allow for both text entry and pdf uploading for letters of recommendation. It's also nice to generate an automatic confirmation of receipt and thank you email.
4. Minimize the page load time. Those high-resolution pictures of previous participants working in the lab are nice, but they can be challenging from a low-speed Internet connection.
5. Include optional demographic information (gender, race, ethnicity) with a waiver. For example, "I hereby grant the NSF-REU program permission to use the above information for statistical analysis purposes only, with the provision that no personal information will be released to anyone besides those few, qualified researchers doing the statistical analysis and that these researchers will only report/publish aggregate statistics. Your willingness to participate in this statistical survey may help ensure the continued growth and vitality of this federally sponsored program."
6. Include a field on how the applicant learned about your site. This will help identify your most effective advertising techniques.
7. Imbed a date stamp on all applications.

Mentor Training

Undergraduates benefit from research experiences, and good mentoring contributes to these gains. [1, 2] A summary of the current literature on the impact of undergraduate research on students has recently been published by the Council on Undergraduate Research. [3] NSF REU student participants who were asked about how to improve undergraduate research programs suggested increased and more effective faculty guidance, enthusiasm for mentoring, and mentors with an ability to help students develop interesting and doable projects. Some respondents suggested that mentors receive training or that mentoring guidelines be established. [4]

Holding a workshop or series of workshops can be helpful in preparing mentors to work with undergraduates in research. These workshops may be tailored for faculty members or for postdoctoral and graduate student supervisors. Jo Handelsman, Christine Pfund, Sarah Miller Lauffer, and Christine Maidl Pribbenow developed a mentoring workshop as part of The Wisconsin Program for Scientific Teaching . The template for this workshop can be found at the HHMI website. [5] This particular syllabus is designed for an eight-session seminar, but materials can be adapted for different structures. The included case studies are an engaging way of drawing workshop participants into a discussion of relevant mentoring issues. A panel of experienced mentors answering questions from an audience can also be an effective component of a one-session workshop.

Some issues for future mentors to consider are listed below.

1. How have I been mentored? Has it been effective?
2. What makes a good research project?
3. What skills does an undergraduate student bring, and what skills need to be developed?
4. Have I articulated my expectations for the work schedule, lab notebook, ethical conventions, and project reporting to the student?
5. Can I accommodate students with different working styles, backgrounds, and goals within my research setting?
6. Are the roles and responsibilities of the faculty member, graduate student (if relevant), and undergraduate clear to all involved?
7. When can I trust the undergraduate's results?
8. How independently can I expect the undergraduate student to function?
9. What should I do if the undergraduate is not meeting my expectations?
10. How will I know if my mentee is experiencing problems, either related or unrelated to research?
11. How should I handle conflict between the undergraduate and other members of the group?
12. Are there special issues to consider when the undergraduate is a transient, who will only be there for the summer?

Cited References

1. Hunter, A.B., S.L. Laursen, and E. Seymour, Becoming a scientist: The role of undergraduate research in students' cognitive, personal, and professional development. Science Education, 2007. **91**(1): p. 36-74.
2. Russell, S.H., M.P. Hancock, and J. McCullough, *The pipeline - Benefits of undergraduate research experiences.* Science, 2007. **316**(5824): p. 548-549.
3. Crowe, M. and D. Brakke, Assessing the Impact of Undergraduate Research Experiences on Students: An Overviewof Current Literature. Council on Undergraduate Research Quarterly, 2008. **28**(4): p. 43-50.
4. Russell, S.H., M.P. Hancock, and J. McCullough. *Evaluation of NSF Support for Undergraduate Research Opportunities: Follow-up Survey of Undergraduate NSF Program Participants*. 2006 Available from: http://www.sri.com/policy/csted/reports/university/documents/URO%20FollowupSurveyRpt.pdf.
5. Handelsman, J., et al. *Entering Mentoring. A Seminar to Train a New Generation of Scientists*. Wisconsin Program for Scientific Teaching 2005 Available from: http://www.hhmi.org/resources/labmanagement/downloads/entering_mentoring.pdf.

Tracking REU Students

For a successful and sustainable REU program, tracking REU participants is critical. Not only do former REU participants offer one of the best connects for recruitment of new REU students but also the status of former REU participants must be included in future REU proposal renewals. There are two excellent ways to track REU participants:

1. E-mail network: collect e-mail addresses from your REU participants and set up your own e-mail network to facilitate communication. Be sure to follow up with your REU students at regular intervals (i.e. every six months) after their departure from your program. REU students are always eager to share updates about their academic progress and professional development.

2. Establish a Facebook group or page. This is a terrific way to maintain connections to each group of REU participants. Ask your REU students to become a member of the group or fan of the page before they depart from your program.

REU Participant Payment Ideas

There is not a standard process for paying REU students, and the best choice may depend on institutional rules and regulations.

Students may be put on the payroll and paid as workers. The advantage of this approach is that it allows students to be covered by workman's compensation. However, students may grumble about having taxes withdrawn throughout the summer, even if they will eventually receive this money in their tax refunds. Depending on your institution, students may need to be paid according to the schedule set by payroll, which may or may not be convenient for your program. Students will need to be reminded to bring their social security cards with them in order to complete W2 paperwork. They also may need to bring their bank's routing number to set up direct deposit.

Alternatively, students may be awarded a fellowship or scholarship that is administered as a stipend. This is also taxable income, but the taxes are not withheld. It may be possible to release portions of the stipend at periodic intervals throughout the summer. It is often useful to have a partial payment soon after the students arrive, so they can cover any necessary moving and set up expenses. However, it may be wise to withhold the full payment until the students have completed most of the program. The disadvantage of paying through a stipend is that students will not be covered by workman's compensation. Especially if students are not formally enrolled in a class, liability issues will need to be addressed.

Students who are formally enrolled in a class will need to have their tuition and fees paid. Depending on the institution, these fees may be waived or reduced as institutional support.

How to write an annual REU report.

The annual REU report must be submitted on Fastlane using the Project Reports system. The main sections of the report are:

1. Participants
2. Activities and Findings
3. Publications and Products
4. Contributions
5. Conference Proceedings

1. Participants:
Project Participants need to be entered directly using the Fastlane Project reports interface. For each REU student, you will be asked to provide the following information:

- Name:
- Worked for more than 160 Hours: (yes or no)
- Contribution to Project:
- Years of schooling completed:
- Home Institution:
- Home Institution if Other:
- Home Institution Highest Degree Granted(in fields supported by NSF):
- Fiscal year(s) REU Participant supported:
- REU Funding:

You will also enter any organizational partners and/or collaborators.

2. Activities and Findings
In this section, you will provide information about the major activities and findings of your REU project. You will be asked to:

a) Describe the major research and education activities of the project.
b) Describe the major findings resulting from these activities.
c) Describe the opportunities for training, development and mentoring provided by your project.
d) Describe outreach activities undertaken during your project.

The Project Activities and Findings for a) and b) may either be submitted using the text boxes in Fastlane or by attaching a pdf file with the required information. Information related to c) training, development and mentoring and d) outreach should be entered directly into the text boxes.

Note: NSF would like to encourage PI's to submit their data in the report template (text boxes) -- not in an attached pdf. The reason that this is preferred is that the report text is searchable with NSF systems, while the pdf is not.

3. Publications and Products
Publications and products should be entered directly into Fastlane. Several categories are included:

- Journal publications
- Books or other non-periodical, one-time publications
- New web site or other Internet site
- Other specific products (databases, physical collections, educational aids, software, instruments, or the like)

4. Contributions
In this section, you will be asked to describe the unique contributions, major accomplishments, innovations and successes of your project relative to the principal discipline(s) of the project, other disciplines, human resource development, research and education resources and contributions beyond science and engineering.

5. Conference Proceedings
Conference proceedings should be entered directly into Fastlane.

NSF Highlights
PIs should consider submitting NSF Highlights while working on the annual report. An interesting (useful) Highlight will focus on an outcome or discovery that involved REU student work. REU does not generally receive many Highlights. These Highlights are important to NSF for a number of reasons, not the least of which is that the materials in these Highlights are often used to make the case to Congress for NSF's budget request.

Here is the link for the "Call for Chemistry Highlights":
http://www.nsf.gov/pubs/2010/nsf10020/nsf10020.pdf

How do REU Sites leverage resources/funds from other university sources?

1. Administrative assistant support (for smaller schools it is difficult)
2. Support for additional students from other university sources
3. Salary support for REU Director
4. Materials and Supplies for REU program and Mentors
5. Discount or financial support for REU students' housing, tuition, and food
6. Local travel, social events, and travel to other conferences for students
7. Cost for inviting speakers for the REU program
8. Leveraging funds by collaboration with other programs on campus with common interests
9. Cost for evaluation
10. Cost for publication/Free webmaster

Volunteer to Serve on an REU Review Panel

The National Science Foundation continually seeks qualified reviewers for the various grants programs they administer. Review of REU proposals is done through a panel process. Panelists are sent a subset of the submissions in any given cycle to review. Reviewers provide written reviews in advance of the panel meeting. At the meeting, each of the proposals is discussed, after which the panel ranks them in order of priority for funding. Serving on a panel is one of the best means of learning the characteristics that are the hallmarks of the best REU proposals.

There are two common ways to be selected for a review panel. A Program Officer may be aware of an individual's suitability to serve as a reviewer and invites her or him to participate. The other is to volunteer to serve. Program Officers are very receptive to volunteers because it indicates a strong commitment and interest to a particular program. Obviously PIs of REU sites are likely candidates for service on an REU panel, although the panels are not large enough to involve every PI. Therefore, even if you are a PI, it is still useful to volunteer to serve on the review panel. Service on a review panel can be especially helpful to individuals who have tried but failed to secure funding for an REU site. Of course, you cannot serve as a reviewer if you have a proposal pending.

More information about the review process within the Chemistry Division of NSF can be found at the following web site: http://www.nsf.gov/mps/che/reviewer/reviewer_info.jsp

The on-line form to volunteer as a reviewer can be found at the following web site: http://www.nsf.gov/mps/che/reviewer/ReviewerForm.cfm

Summary of an Average REU Site Budget

REU project costs are mainly for participant costs. As a guide, the average grant totals around $700 to $900 per student per week. These items are considered allowable participant costs: participant stipends (approximately $400-450/student/week), participant travel to REU site and participant travel to professional meetings, participant subsistence while living on campus, on-campus housing and parking, research materials and supplies for participants.

Other allowable costs typically include: one-month summer salary for senior personnel (with fringe benefits), an administrative allowance (up to 25% of the participant stipend costs), and costs to support a closing reception. An additional amount of $4,000 per year may be requested to support ethics activities.

A typical breakdown per student is shown:

- Stipend $5,000
- Travel allowance $350
- Dormitory and meal plan $3,000
- Research material/supplies: $500
- Box lunches: $125
- Poster supplies: $25
- Fringe: $336

The total allocation per student is approximately $9,291.

The following links may provide further guidance on the allowed costs and cost principles:
http://www.nsf.gov/pubs/manuals/gpm05_131/gpm6.jsp
http://www.whitehouse.gov/omb/circulars_a021_2004/.