

Merit Review Criteria

In 1997 the National Science Board (NSB) instituted two merit review criteria for evaluating proposals: Intellectual Merit and Broader Impacts.

What criteria are used to evaluate Intellectual Merit in research proposals?

- ~ Potential of advancing knowledge and understanding within and across fields
- ~ Qualifications of proposer
- ~ Creativeness, originality or potentially transformative nature of the concept
- ~ Conceptualization and organization
- ~ Accessibility to resources

What criteria are used to evaluate Broader Impacts in research proposals?

- ~ Advancement of discovery and understanding while promoting teaching, training and learning
- ~ Broaden the participation of underrepresented groups
- ~ Enhancement of infrastructure for research and education, such as facilities, instrumentation, networks and partnerships
- ~ Provide benefits to society
- ~ Dissemination of results to enhance scientific and technological understanding

Photo on the front cover: Every year for the last 12 years, Lindsay Shopland and a team of scientists from The Jackson Laboratory spends three days in a second grade class to introduce the processes of science through bacteriology. Award #MCB-0817787

Photo on the inside front cover: Sue Whitsett, third from left, who prepared this brochure, is an Albert Einstein Distinguished Educator Fellow serving at MCB. She has been a classroom biology teacher for twenty-nine years and an RET participant for six summers. Sue is at a National Lab Day program in Washington, DC.

*With your help
today's students
can become
tomorrow's scientists*



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Broader Impacts

*How to include
preK–12 outreach
in your
research proposal*



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Helpful advice for Principal Investigators (PIs) from a K-12 educator

How to Get Started:

Communicate with interested teachers and/or school districts before writing your proposal.

Understand the structure of the school and/or district (i.e. Public, private, charter, vocational).

Discuss realistic links between your research and education standards with teachers and/or administrators.

Check your College of Education for science education faculty involved in inservice programs for teachers.

Sign up for a National Lab Network Activity. (<http://www.nationallabnetwork.org/>)

Think about your Broader Impacts in the context of your research project.

Write the Broader Impacts with the same rigor as the Intellectual Merit.

Activities that have low impact:

- ~ One day workshops for teachers
- ~ Lecturing in a classroom by the PI
- ~ Arranging site visits to your lab for recruitment of high school students



Effective ways to include preK-12 Students as part of your Broader Impacts

Provide actual research experiences for students:

- ~ In their own classroom
- ~ In your lab

Mentor students for their science fair projects.

Involve students in analyzing your data.

Set up multiple-day summer science camps.

Conduct field trips to your lab or unique research sites which are part of a classroom activity.

Provide hands-on activities in classroom:

- ~ Developmentally appropriate
- ~ Safe
- ~ Relevant to teacher's curriculum
- ~ Developed with the teacher
- ~ STEM (Science, Technology, Engineering, Mathematics) related

Host RAHSS (Research Assistantships for High School Students) in your lab.

- ~ Supplemental funding to current BIO awards to broaden participation in the biological sciences



Hazel Holden at UW-Madison worked with an RET participant and his middle school students in Project CRYSTAL (Crystallographers Researching with Young Scientists: Teaching and Learning). The students produced a crystal and became co-authors on a recently published paper in the Journal, *Biochemistry*. Award # MCB-0849274

Effective ways to include preK-12 Teachers as part of your Broader Impacts

Provide Professional Development in Content Areas:

- ~ Relevant to K-12 Science Education Standards
- ~ For groups of teachers
- ~ Include discussion of STEM careers
- ~ Include inquiry based experiences

Provide Professional Development in Lab:

- ~ Content knowledge
- ~ Technique
- ~ Scientific process

Provide Resources for teachers:

- ~ Make equipment available for teachers to use in their classroom
- ~ Expose teachers to cutting edge research
- ~ Allow teachers to use materials/activities developed by lab

Provide workshops:

- ~ Multiple days
- ~ Summer opportunities
- ~ Compensation/graduate credit
- ~ Provide follow-up
- ~ Facilitate collaboration among teachers

Set up "Research Experiences for Teachers" (RET)

- ~ Group of teachers
- ~ Require teachers to develop curriculum
- ~ Schedule time for teachers to collaborate and exchange ideas with other teachers and scientists
- ~ Meaningful research project
- ~ Interactions with the PI and research community
- ~ Provide time for teachers to process experiences

Associate Professor Rebecca Alexander of Wake Forest University has developed and taught workshops on "The Science Behind Biotechnology" for middle and high school teachers during the summer. Award # MCB-0448243

