American Society for
Biochemistry and Molecular Biology
11200 Rockville Pike, Suite 302
Rockville, Maryland
20852-3110

ASBMB response to the National Institutes of Health request for information on a Strategic Plan for the Office of Research Infrastructure Programs: Office of Science Education/Science Education Partnership Award

Prepared by the ASBMB Public Outreach Committee

Submitted March 2, 2015

1. **Relative strengths and weaknesses of the two approaches programs typically employed to expand the pool of students interested in careers in the biomedical workforce (science teacher professional development or student enrichment programs e.g., summer research internship programs).**

The American Society for Biochemistry and Molecular Biology (ASBMB) is very supportive of existing programs that provide resources and professional development training for K-12 STEM teachers. In fact, ASBMB itself sponsors the Hands-on Opportunities to Promote Engagement in Science (HOPES) seed grant program, which supports local partnerships between researchers and K-12 teachers that aid science teaching, as well as student engagement and learning. ASBMB has also supported teacher professional development workshops at the University of California, Riverside. We strongly encourage funding in this area, and would welcome the opportunity to share our results and partner with NIH to help develop sustainable programs.

ASBMB is also generally supportive of student internship programs. However, the society recommends that more effort be made to reach a wider array of students at earlier ages, in order to broaden the diversity of participants in such programs. To do so, ASBMB encourages utilizing additional approaches, such as science fairs, afterschool programs and public events like science festivals, that engage students outside of the classroom and laboratory.

2. **Possible roles that SEPA might use to potentially better utilize the NIH extramural research community as a resource in teaching, mentoring, and providing educational opportunities for pre-college students and teachers.**

The SEPA program has the potential to have an enormous impact on science education by sharing major themes and best practices learned from the multitude of programs it has supported. Due to its small size, it is necessary for the SEPA program to partner with larger institutions in order to have maximal impact.

One way to do so would be to support interactive information sessions and workshops at professional scientific conferences such as the annual Experimental Biology meeting, of which the American Society for Biochemistry and Molecular Biology (ASBMB) is a sponsoring society.

American Society for
Biochemistry and Molecular Biology
11200 Rockville Pike, Suite 302
Rockville, Maryland
20852-3110

Possible examples include presentations from SEPA staff on the program and the activities it supports, and networking sessions that showcase such activities and allow for development of future projects and collaborations, an approach ASBMB has successfully used for its Hands-on Opportunities to Promote Engagement in Science (HOPES) seed grant program. A high percentage of attendees at these meetings are supported by funding from NIH, making them a prime audience for receiving such information.

SEPA should also work with the other NIH institutes and centers to help promote its efforts. This step will have the added benefit of encouraging the ICs to unify and coordinate their individual public engagement efforts, which will have an exponentially beneficial impact on science literacy.

3. **Promotion of a better appreciation on the part of science teachers and students of the importance of "STEM skills" in a variety of careers not immediately considered STEM fields. Most P-12 students will never aspire to careers as biomedical researcher, clinician scientists, or most other clearly "STEM" professions. However, there are many career paths such as science writer, actuary, clinical nurse, veterinarian, technology transfer officer, etc. that make heavy use of "STEM skills."**

The SEPA program mission is to "improve life science literacy throughout the nation through innovative educational programs." An increased appreciation of so-called "STEM skills" and potential STEM careers is an inevitable by-product of the interactions fostered by SEPA-supported programs. However, given SEPA's relative small budget, the American Society for Biochemistry and Molecular Biology (ASBMB) feels that using the program's resources for direct promotion of such efforts is inappropriate and should not be its primary focus. Instead, ASBMB urges the development of a more precise definition of the scope of SEPA that is consistent with the stated goals of the program.

To further clarify SEPA's role and prevent duplicative effort, ASBMB encourages SEPA to coordinate with those NIH programs that are more explicitly focused on training, such as the Broadening Experiences in Scientific Training program, and the various career development and training programs housed within the National Institute of General Medical Sciences. This approach will enhance the efficacy of both SEPA and the training programs by clearly defining their respective roles, and will encourage intra-agency collaboration that can address any potential areas of overlap.

4. **Approaches that the SEPA could use to support replication of programs once they have been proved effective by rigorous evaluation. Reports on federally funded STEM investments consistently recommend the replication of programs once they have been proved effective by rigorous evaluation.**

American Society for
Biochemistry and Molecular Biology
11200 Rockville Pike, Suite 302
Rockville, Maryland
20852-3110

A major constraint to effective replication of successful programs is the "innovation" requirement for SEPA grant applications, which forces applicants to demonstrate the novelty of their approach, thereby restricting the ability to implement strategies already demonstrated to be successful. The American Society for Biochemistry and Molecular Biology (ASBMB) recommends that this requirement be loosened so that variables such as audience, location and expected participants can be considered as part of a program's novelty.

Another approach to supporting effective replication would be to develop platforms for dissemination of main themes and best practices, incorporating insight and feedback from programs and partners supported by SEPA. Again, an effective way for SEPA to implement this recommendation would be to support interactive information sessions and workshops at professional scientific conferences such as the annual Experimental Biology meeting, of which ASBMB is a sponsoring society.

Finally, SEPA should work to form partnerships with teacher-focused groups like the National Science Teachers Association and the National Association of Biology Teachers, whose members would not normally have direct access to the NIH. Making an explicit link between NIH-supported researchers and K-12 teachers will aid dissemination of useful information and best practices, in particular with regards to approaches that will help implementation of the Next Generation Science Standards.

5. **Suggestions on how NIH can better coordinate its large portfolio of pre-college STEM activities in order to enhance their effectiveness and potential for SEPA to clarify its unique role as part of this portfolio.**

In order to improve the effectiveness of the SEPA program, the American Society for Biochemistry and Molecular Biology (ASBMB) recommends that SEPA articulate its own overarching goal. In the opinion of ASBMB, this goal should be "to improve P-12 science education."

To achieve this goal, ASBMB recommends three main approaches:

- Provide training and resources for teachers
- Provide research opportunities for students
- Provide support for researchers to participate in partnerships with teachers

Under this approach, SEPA would not directly focus on career development, which would be left to other departments within the agency. To ensure smooth implementation, NIH can then move forward by defining the role of SEPA within the agency. NIH should also define the scope and aim of other programs and opportunities that are focused on P-12 STEM education, such as the various career development and training programs housed within the National Institute of General Medical Sciences.

American Society for
Biochemistry and Molecular Biology
11200 Rockville Pike, Suite 302
Rockville, Maryland
20852-3110

Having settled on these defined internal parameters, ASBMB next recommends that NIH work with Congress to explicitly define what role it will take in the science education sphere, making sure that the agency has the congressional authority to do so. Currently, it is unclear from NIH's congressional mandate what role the agency should be playing a role in P-12 education. Once defined, this role should be incorporated into the agency's mission statement.

6. **The ways in which the SEPA program supports the Federal STEM Education 5-year Strategic Plan and opportunities that may exist for SEPA to support the Federal STEM education programs at other federal entities, e.g. NSF, NASA, Department of Education.**

SEPA currently addresses all of the goals of the Federal STEM Education 5-year Strategic Plan in a broad way. The American Society for Biochemistry and Molecular Biology (ASBMB) recommends that, in order to be maximally effective within the scope of this plan, SEPA narrow its focus by coming up with a defined program goal that allows for the development of reasonable targets and evaluation metrics.

Given limited resources, ASBMB recommends that NIH, and SEPA in particular, focus on providing support and insight on germane biomedical issues (such as personalized medicine, animal use in research, and neuroscience) for researchers and teachers, topics that other agencies are not set up to address.

SEPA can then work with similar programs at other federal agencies (such as the National Science Foundation's Advancing Informal STEM Learning program) to form a collective that organizes and disseminates information and best practices, as several of these main themes and approaches are applicable regardless of topic or funding source.

This approach will ensure overlapping effort that is not duplicative, as well as providing a diversity of STEM-related content from all of the different federal agencies. Moreover, such coordination amongst agencies can also provide geographic diversity, as programs and investigators supported by one agency may cover areas that are lacking for another (for example, NIH vs. USDA).

7. **Relative effectiveness of various venues for educating P-12 students, parents and the community about the ethical use of animals: In-school; After-school; Family health night; Science Fairs; etc.**

The scientific community has, for the most part, done a good job coming up with positive demonstrations of the beneficial (and ethical) use of animals in research, both through formal laboratory experiments and demonstrations, and informal outlets such as science fairs and science festivals. The American Society for Biochemistry and Molecular Biology (ASBMB) recommends

American Society for
Biochemistry and Molecular Biology
11200 Rockville Pike, Suite 302
Rockville, Maryland
20852-3110

that these efforts continue, and is willing to work with teachers, parents, researchers and institutions to help facilitate their implementation and expansion.

One area where such interactions have been less successful is in dealing with policymakers. ASBMB recommends that SEPA (and all federal agencies) work closely with professional societies to develop strategies that address the various political nuances that become intertwined with the factual benefits of the use of animals in research. In conjunction with its partners in the Federation of American Societies for Experimental Biology, ASBMB is committed to playing a leading role in this area.

8. **New approaches SEPA might use to improve community health literacy and public understanding of the NIH mission and as well as an understanding of the goals and benefits of basic and clinical research.**

Evaluation of informal STEM education programs is currently woefully inadequate. Better evaluation will allow stakeholders to improve the efficacy of such programs, which will have the ultimate effect of improving public understanding of all facets of science. The American Society for Biochemistry and Molecular Biology (ASBMB) recommends that SEPA mandate that a certain percentage of funds from every award made be applied towards evaluation, thereby making evaluation an integral, required component of all supported programs.

ASBMB also recognizes that the success of informal education programs depends on the quality of not just teachers, but the researchers with whom they work. Programs that prepare researchers to organize and participate in informal education activities are being developed at universities and by organizations such as ASBMB. A SEPA-funded grant program that supports such training in developing outreach programs and participants would therefore be of great use.

As a way to magnify the effect of its various disparate awardee programs, SEPA should introduce grant mechanisms that would allow for the support of the biennial International Teacher-Scientist Partnership conference that brings together experienced stakeholders from across the country. Another approach would be for SEPA to sponsor or provide support for the hosting of regional conferences that would allow geographically-proximal groups to connect and expand their efforts locally.

ADDITIONAL COMMENTS

The American Society for Biochemistry and Molecular Biology (ASBMB) is strongly in favor of robust, sustained federal support for informal education programs such as SEPA, and advocates for efforts that maintain and increase this support. However, effective advocacy for this program (and other similar ones) has been difficult. Therefore, ASBMB wishes to emphasize that the most useful step in developing a strategic plan for SEPA is coming up with a defined goal statement for

American Society for
Biochemistry and Molecular Biology
11200 Rockville Pike, Suite 302
Rockville, Maryland
20852-3110

the program that fits within precise parameters delineating its role within NIH, and the federal STEM education program at large.

ASBMB also notes that K-12 science teachers are (in part) the products of undergraduate science degree programs. To help ensure adequate preparation for future teachers, the society recommends that SEPA coordinate its efforts with programs, from both the government and the private sector, focused on improving the quality of undergraduate science education programs. Such coordinated effort will help provide a continuous, inclusive scientific environment from pre-K all the way through college, thereby strengthening teacher preparation and ability.