

**Testimony of Judy Snyder**  
**Mathematics Teacher**  
**The Role of the National Science Foundation in K-12 Science and Math Education**  
**U.S. House of Representatives**  
**Committee on Science**  
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Chairman Boehlert and members of the Committee:

I appreciate the opportunity to share with you the impact of NSF programs from my viewpoint as a teacher of high school mathematics. From my position at the receiving end of NSF's educational programs I believe the strength of the Foundation lies in its unique ability to tap the creativity of university scientists, mathematicians, and educators to direct their visions toward helping teachers in the classroom. The NSF programs I have been fortunate enough to participate in have been grounded in content and research but have been equally balanced with pedagogy. The opportunity they have provided for collaboration between K-12 teachers and higher education has enabled me to build relationships that have molded and shaped my teaching career.

My participation in an NSF sponsored program at Furman University provided me with an increased knowledge of science and research that led me to pursue classroom collaboration with a biology teacher. The "Young Scholars" summer program provided immersion in science classes and research opportunities for gifted high school students and a few lucky high school teachers. This program made me realize that high school students are capable of doing research at a level beyond what I considered possible and allowed me to experience first hand how exciting hands-on research can be. I took away from this program the desire to involve my students in hands-on learning connecting math and science. Relationships built with Furman science faculty as a result of this NSF program proved immediately beneficial. A Furman plant physiologist, Dr. Laura Thompson, aided in the writing and implementation of a GTE Growth Initiatives for Teachers grant that funded technology and professional development opportunities to connect math and science. That grant allowed a biology teacher and me to develop activities connecting geometry and biology. One of the activities involved comparing the shapes of "sun" and "shade" tree leaves in geometry class and examining the differences in chlorophyll content in the same leaves in the biology lab. A second activity involved using surface area-to-volume-ratios studied in geometry to make the connection to cell-size and cell-diffusion in the biology lab.

NSF also funded a teacher enhancement program at the University of South Carolina at Spartanburg, entitled "Partnership for Excellence: A Model Program for Professional Development of Middle and Secondary School Mathematics Teachers." This program offered workshops, academic year courses, and summer institutes designed to increase teachers' effectiveness in implementing national curriculum and evaluation standards. I took several of the courses offered through this program and they changed my approach to teaching. These courses not only deepened my content knowledge, but modeled a hands-on, inquiry-based, technology rich approach to teaching. Dr. Celia Adair, the principal investigator of this program, taught several of the courses, modeling in her teaching the pedagogical approach encouraged by the national standards. She has become a mentor, not only for me, but for teachers all over the

state. I learned from her and from this program a new approach to teaching. This has resulted in several successful grant applications providing materials and technology necessary for the discovery approach to teaching I have tried to infuse into my classroom. One of the activities I developed as a result makes the connection between music and mathematics, and another asks students to answer the question, “Why are there only five regular polyhedra?” It was this second activity that I used in my Presidential award application.

I believe one of the strong points of NSF programs is the balance between content, research, and pedagogy. Dr. Adair’s program at USCS best answers the question about prioritizing content vs. pedagogy by demonstrating that they should not be separate entities. If teachers are exposed to content without pedagogy, they are just like the students they lecture to. They can be heard to grumble “When am I ever going to need to know this?” When teachers get pedagogy without content, they can be heard to grumble, “If I have to sit through one more session on learning styles, I’m going to scream!” When content and pedagogy are taught in concert both become meaningful. Content makes sense to students and teachers alike when they are “discovering” it and “doing” it. Many teachers still teach the way they were taught – by lecturing. Changing how teachers are taught can and does result in a change in the way they teach. Therefore, NSF programs that combine content and pedagogy will have the most impact on improving the capabilities of science and math teachers. I also believe that NSF could improve education programs by taking advantage of talented high school teachers such as the Presidential Awardees in town this week to offer professional development programs for other teachers.

I believe collaboration between NSF, the Department of Education, and other agencies, is important. NSF is best suited to the development of new programs that take advantage of the creativity of the scientific community. The Department of Education should take those programs that have proven successful and provide funding for their continuation and for the publication of resulting materials. Dr. Adair’s program at USCS was funded for an additional two years with Eisenhower funds, much to the benefit of teachers in South Carolina. One of the teachers benefiting from the continuation of this program was Joyce Dodd, last year’s Presidential Awardee from South Carolina.

In conclusion, I believe that NSF must continue to have a strong role in K-12 education. It is possibly the only agency that can make the long, sustained effort necessary to improve math and science education because it is less subject to the shifting winds of political opinion. Additionally, its funding is direct, and funding from agencies such as the Department of Education often comes through the states down to the district level. School districts are subject to constant change meaning that programs showing promise may not last long enough to show results if a new superintendent with a new agenda is hired. NSF programs are not affected by that kind of instability and are thus the best hope for K-12 educators.

Thank you for the opportunity to speak on behalf of the many teachers and students who have benefited from the commitment of NSF to the improvement of math and science teaching. It is my hope that K-12 teachers will continue to be the beneficiaries of this commitment.

This concludes my statement, Mr. Chairman. I will be glad to respond to any questions the committee may have.