COVER SHEET FOR PROPOSALS TO THE NATIONAL SCIENCE FOUNDATION

APPENDIX IV

FOR CONSIDERATION BY NSF ORGANIZATION UNIT (Indicate the most specific unit known, i.e. program, division, etc.)	PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE
Teacher Preparation and Enhancement	Teacher Enhancement Program/February 1 91-105

EMPLOYER IDENTIFICATION NUMBER (EIN) or TAXPAYER IDENTIFICATION NUMBER (TIN)	SHOW PREVIOUS AWARD NO. IF THIS IS: ☐ A RENEWAL or ☐ AN ACCOMPLISHMENT-BASED RENEWAL	IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES_____ NO_X_; IF YES, LIST ACRONYM(S)

NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE:	INSTITUTION CODE (If known)
University of Utah	

ADDRESS OF ORGANIZATION (INCLUDE ZIP CODE)

Salt Lake City, Utah 84112

IS SUBMITTING ORGANIZATION: ☐ For-Profit Organization; ☐ Small Business; ☐ Minority Business; ☐ Woman-Owned Business

BRANCH/CAMPUS/OTHER COMPONENT (Where work is performed, if different)	INSTITUTIONAL CODE (If known)

TITLE OF PROPOSED PROJECT (1) NSF —

Enhancing Integrated Science Education: Elementary Teachers/Research Activities and Interactions.

REQUESTED AMOUNT	PROPOSED DURATION (1-60 months)	REQUESTED STARTING DATE
$273,002	36 months	8/1/92

CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW:

- ☐ Vertebrate Animals
- ☐ Human Subjects
- ☐ Research Involving Genetically Engineered Organisms
- ☐ Historical Places
- ☐ National Environmental Policy Act
- ☐ Proprietary and Privileged Information
- ☐ International Cooperative Activity: _____ Country/Countries
- ☐ Facilitation Award for Handicapped
- ☐ Research Opportunity Award
- ☐ Disclosure of Lobbying Activities

PI/PD DEPARTMENT	PI/PD PHONE NUMBER/ELECTRONIC MAIL ADDRESS	PI/PD FAX NUMBER
Center for Integrated Science Education	801-581-4379	801-581-8692

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3. PROJECT SUMMARY

Although there are a growing number of programs and opportunities for the enhancement of the science content and teaching skills of teachers, the typical elementary teacher still exhibits high science/mathematics anxiety levels and has difficulty incorporating modern science education activities into his/her classroom environment.

The Center for Integrated Science* Education (CIS*E) at the University of Utah is focusing its activities on elementary and middle school teachers with high science/math anxiety levels. By the careful selection and encouragement of science faculty and researchers with exceptional interpersonal skills, and by the selection and encouragement of elementary teachers who have not participated in or have not been successful in other science activity enrichment programs, the Center proposes to provide opportunities for direct one on one interaction in the science discovery process.

Funding is requested for three years for three major activities:

1) Science discovery projects involving small groups of elementary teachers working with small groups of University scientists/educators.

2) Enhancement of social interactions between outstanding scientists of Nobel Prize caliber and elementary teachers in nonthreatening social settings.

3) The establishment and conduct of contests to encourage individuals, classrooms, and coalitions of classrooms to work on appropriate, but novel and unique, projects.

The Center's programs will greatly enhance respect and prestige for teachers in the eyes of the general public as well as serving to minimize and hopefully eliminate the science fears and anxieties of many of our elementary teachers.

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* The term "science" used here follows the common journalism/mass communications definition:...science refers to issues and subjects involving science, mathematics, technology, engineering, and medicines.

6. RESULTS FROM PRIOR NSF SUPPORT

The PI has an NSF International Cooperative Research Award (INT 87-19079) with Dr. Hai Bang Lee in Daejung., S. Korea. That grant does not deal with education activities.

7. PROJECT DESCRIPTION

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The Center for Integrated Science* Education (CIS*E) at the University of Utah is focusing its activities on elementary and middle school teachers with high science/math anxiety levels. By the careful selection and encouragement of science faculty and researchers with exceptional interpersonal skills, and by the selection and encouragement of elementary teachers who have not participated in or have not been successful in other science activity enrichment programs, the Center proposes to provide opportunities for direct one on one interaction in the science discovery process.

Through these programs and others, the Center is building coalitions and alliances between practicing scientists and engineers in the University and elementary teachers and their administrators in the region.

The coalition includes close interaction with local museums and an evolving science center, as well as with the local press to encourage public awareness and general public involvement with the programs.

We propose a 3 year project with an annual review and critique and with extensive dissemination activities. The projects will particularly target gender and ethnic minority participation.

Fund is requested for three major activities:

Project 1: Group projects with University educator/researchers.

Three, five person teams will be selected and assembled to work with three, 3 person teams of University scientists. The plan is to select the

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participants in late fall after the new school year has begun. Interactions and project activities would be carried out during Christmas and spring recesses. The project will be completed by mid-summer. It is expected that the teachers would spend a total of 4-6 full time weeks on the projects in the University laboratories.

Participants will be selected based on discussions with elementary school principals, teacher leaders, and curriculum specialists from the various school districts in the region. Particular emphasis will be placed on the selection of participants who have recognized science and math anxieties and on minority and disadvantaged teachers.

The science researchers will be selected by CIS*E faculty from among the some 2,000 scientists, engineers, and technical staff people working in research labs at the University of Utah. Emphasis will be placed on the selection of teams of 3 individuals who already work closely together in integrated, interdisciplinary activities and who have the unique skills for interaction with people with weak science backgrounds. We will select individuals with an effective track record in science interpretation for the general public, in liberal and general education science courses, and in working with the general public.

The five teacher participants and the three scientist/staff people will have a series of very informal get acquainted meetings, initially conducted and organized by CIS*E faculty and staff. The group will assess their science interests and backgrounds and their interests in becoming involved in the discovery and learning of several key science concepts. They will then <u>together</u> formulate a project which meets these needs.

The Center staff will already have identified some ten or so possibilities based in part on the Science Without Walls curriculum which the Center is now developing at the University of Utah.

Each of the participating laboratories will be compensated $1500 in "lab time" to cover laboratory supplies, access to equipment, and for some technician time.

The faculty participants will volunteer their time for these projects. Each of the teacher participants will receive a stipend of $500 at the <u>conclusion</u> of the project.

In year one the activities will be focused on the Salt Lake urban area (roughly 900,000 people) utilizing faculty from the University of Utah and teachers from the local urban school districts. In year two the program will expand to the state of Utah (1.5 million people), utilizing scientists/researchers from institutions of higher education and elementary

teachers from districts throughout the state. In year three the program will expand to consider the intermountain region, focused particularly on school districts and communities within a 300 mile radius of Salt Lake City (about 2.0 million people).

In all cases where there is a local college, the Center and its staff will endeavor to involve their participation in the activities, thereby enhancing the formation of a network between higher education, community colleges and the local school districts.

These activities will be publicized in the Center's Newsletter as well as via the local press. Science and education reporters with all appropriate news media, including daily and weekly newspapers, as well as radio and t.v. communications professionals, will be involved and informed.

The Center will endeavor to obtain as much effective publicity as possible regarding these programs, thereby informing the general public, as well as other teachers and students, and thereby encouraging and enhancing their awareness of and participation in science and related activities.

Project 2: Distinguished lecturers and special receptions.

Teachers in the United States are often not treated with the professionalism, respect, and prestige that they are in other nations of the world.

This project will provide an opportunity for teachers to literally get to know an absolutely outstanding and distinguished scientist in a low anxiety, social setting.

We propose to invite at least two distinguished scientists per year of Nobel Prize caliber and reputation to give general public lectures/demonstrations throughout the region. These public appearances will be followed by social receptions in which the participants will have the opportunity to interact with the visitor, as well as local scientists who are friends and acquaintances of the visitor. There will also be a number of specific workshop/discussion sessions with the visitor, involving a small number of invited teachers.

The emphasis will be on showing these teachers with high science anxiety levels that they can indeed interact with, talk with, communicate with an outstanding scientist and public figure. Of course, the scientist public figure will be selected for her skills in conveying concepts to lay audiences; in some cases these individuals will have been authors of general science books which have already received a wide audience.

The opportunity for an elementary teacher to shake the hand and discuss some topic with a Nobel Prize winner will do more for self-confidence and personal professionalism than hundreds of typical inservices, workshops, or special programs.

As a specific example; Pierre Gilles de Gennes, the 1991 Nobel Prize winner in physics, spent a week several years ago, lecturing at the University of Utah, after spending two weeks touring throughout Southern Utah. Professor de Gennes is an enchanting, dynamic, humble and absolutely wonderful speaker who puts everyone immediately at ease. He has been invited in April, 1992 to give a series of lectures and receptions for high school science teachers in the Salt Lake area.

There are many other such individuals who would also be appropriate for this project.

We are confident that we can successfully carry out this program, because the University of Utah is a leading research university, whose faculty and staff interact with Nobel Prize winners and other scientists of comparable caliber on a regular basis.

Project 3: Contests

The general public, and young students in particular, love contests and competitions. The success of athletics programs is perhaps the best example.

The Center has already experimented with a statewide science contest, aimed at encouraging students and the general public to participate in science observation and discovery activities. The first annual Utah Bioluminescence Contest was conducted May-July 1991 and is described in Appendix A.

We propose to conduct two state and region wide contests each year with individual categories, classroom categories, and school categories. Such contests would in no way substitute or compromise existing science fair activities. Their timing will be chosen so as not to interfere with the typical science fair season. The contests would encourage the involvement of parents and of the general public, as well as students and teachers.

Although the details have not been fully formulated, we expect to have prize categories in various age groups as well as in individual classroom and district school groups.

The contest subject will be chosen so that little or no scientific background or skills are required to participate. Again as an example, see Appendix A.

We will publicize the contests, their activities, and their winners as effectively as possible in all appropriate media.