DESIGNATED RESEARCH INITIATIVE FUND

SPECIAL RESEARCH INITIATIVE SUPPORT (SRIS)
GRADUATE RESEARCH ASSISTANTSHIP (GRA)
SUMMER FACULTY FELLOWSHIPS (SFF)

APPLICATION FORM

Check all that apply: __X__ SRIS __X__ GRA SFF

PRINCIPAL INVESTIGATOR (*one only*) Susan M. Blunck

DEGREE(S) MS Science Education
PhD Education
ACADEMIC TITLE Assistant Professor

SOC.SEC.NO. 479-66-0262 DEPARTMENT Education

DATE OF INITIAL APPOINTMENT AT UMBC July 1995

CAMPUS MAILING ADDRESS Room 433 - Academic IV (Building) 455-2869 (Phone #)
Department of Education (Department)

TITLE OF PROPOSAL: Toward 2000 - The Evolution of Students and Their Professors in Introductory Biology

DOES THIS PROJECT INVOLVE THE FOLLOWING:

Vertebrate Animals	YES ____	NO x
Human Subjects	YES x	NO ____
Hazardous Procedures	YES ____	NO x

COLLABORATORS/CO-INVESTIGATORS

NAME Phillip G. Sokolove DEPT. Biology EXT. 2147

NAME ____ DEPT. ____ EXT. ____

CONDITIONS OF AWARD:

The Applicant affirms that if a Special Research Initiative Support (SRIS), Graduate Research Assistantship (GRA) or Summer Faculty Fellowship is awarded:

1. He/she will submit a research proposal for external funding.
2. He/she will submit a report to the Dean, Graduate Studies and Associate Vice President for Research describing project outcomes, grant proposals/awards.
3. He/she will submit copies of applicable required hazardous procedures, animal, and human subject approvals to this office.

I have read and accept the conditions under which this grant will be awarded:

APPLICANT'S SIGNATURE ____ Date: ____

DEPARTMENT CHAIR'S SIGNATURE or DEPARTMENTAL FACULTY COMMITTEE CHAIR'S SIGNATURE

NAME Susan M. Blunck

OTHER SUPPORT (*extramural and intramural*)

The following information must be included in full: title, source, yearly direct costs, beginning and ending dates, and % effort committed to each project **for the P.I. and all collaborators.**

ACTIVE AWARDS (*including DRIF*):

Current funding totaling $10,000 for period 6/1/95 - 5/31/96 is provided to support all MCTP efforts at UMBC. These National Science Foundation dollars flow from the UMCP campus where the Maryland Collaborative Teaching Project (MCTP) is centered.

They are divided to support a wide variety of MCTP efforts involving other faculty/students on our campus. A small amount of this fund ($4000) has been used to directly support the Biology 100 study.

PENDING AWARDS:

A preprosal has been submitted to The Comprehensive Program Fund for the Improvement of Post Secondary Education (FIPSE) for a total of $406,247 across a 3 year period.

PREVIOUS AWARDS, last 5 years only (*include previous DRIF and extramural support*):

Awards from Maryland Collaborative Teaching Project over the past two years are shown below:

7/1/93 - 8/31/94 $37,214

9/1/94 - 5/31/95 $10,312

Once again, only a small amount of these dollars ($100/yr.) have been used to directly support the Biology 100 study.

NAME Susan Blunck

SRIS BUDGET

(Need only complete if requesting a SRIS award)

	ITEM	AMOUNT
Equipment	Wireless Microphone System (2)	$ 2,904.00
	Wireless FNG Receiver Single Freguency	$ 266.00
	Wierless Transmitter	$ 536.67
	Antenna Splitter-Combiner(2)	$ 1,633.33
Supplies	Battery sled for ENG 4	$ 86.67
	Rack Kit dual receivers(3)	$ 37.33
	Antenna Kit	$ 280.00
	Mic Stands (2)	$ 48.88
Other Expenses	Auto mixer	$ 2,080.00
	Video production	$ 684.37
		$
		$

BUDGET TOTAL

BUDGET JUSTIFICATION

Please provide justification for the budget presented above (*attache additional pages if necessary*):

Equip. cont.

Feedback suppressor	$ 553.29
Equalizer with single channel	$ 337.33
Portable rack	$ 205.13
Power rack distribution	$ 100.00
Fabrication (8)	$ 221.87
Rack shelf	$ 25.13
	$10,000.00

In order to improved the discourse dynamic in the study wireless hand-held microphones are needed as well as other expense dollars to cover some of the video production costs on editing. The goal is to create - professional quality ~~trapiess~~ to demonstrate findings from this study.

NAME Susan M. Blunck

GRA REQUEST

(Complete only if requesting a GRA)

Graduate Research Assistantships will be awarded to faculty on the basis of need for GRA support and appropriateness of the research project for a graduate student. The award is for a Level I stipend (the precise amount is established yearly by the University.

Graduate program(s) with which the PI is affiliated: Education

Please complete:

Student name: _____

Student SS#: _____

Program in which student is enrolled: _____

Has this student received a DRIF GRA previously?

Yes ____ No ____ Date _____

Or check: No student currently named; expect to recruit student ___X___

GRA Justification: Please provide a description of the work scope and manner in which the project will enhance the student's educational program in general. Also provide a justification for the need of DRIF support for the student.

In order to facilitate the timely analysis of data and to provide instructional support, we are requesting a third graduate student. The two graduate students provided by the Biology department are completely focused on their teaching in discussion sections. A great amount of data has been generated during the first phase of this study. The project is in need of a graduate student to serve as an assessment/evaluation specialist with the program. More data will follow with each semester of the project.

NAME Susan M. Blunck

PROPOSAL
Special Research Initiative Support
Graduate Research Assistantship
Summer Faculty Fellowship

The proposal must include: See attached pages.

- **SUMMARY**. This should be written in non-technical language. Please keep in mind that all reviewers may not be experts in your field.

- **TEXT** (**limited to three pages**, proposals exceeding 3 pages will be returned). Figures or tables may be submitted in an Appendix, but reprints should NOT be included. Typeface should be at least 15 characters per inch. Include a clear and concise statement of the specific aims and significance of the proposed research and a description of the experimental approach (including materials and methods). Include an evaluation of potential funding for follow-up work and the role of this project in leading to enhanced external funding or expanded scholarly activity. Address justification for the need for funds. For faculty in the creative or performing arts, the information requested above may be modified as deemed necessary. However, a detailed justification and projected outcome (e.g., publication in a literary magazine, performance of composition, etc.) Must be provided for the creative project.

- **REFERENCES**

A Proposal to the Graduate School for
Designated Research Initiative Fund (DRIF) Awards - Fiscal Year 1997

Summary

Toward 2000: The Evolution of Students and their Professors in Introductory Biology is a study designed to test a number of questions related to making introductory "gateway" biology courses more engaging for students. This comparison study is testing whether biology students in active learning situations with pedagogical savvy science professors have advantages over students in traditional lecture settings. It is providing insights on the teacher change processes accompanying teaching research. This comparison study is examining the impact of student-centered teaching models in a large introductory science course (Biology 100). The following questions are being investigated: What active learning approaches can be used in large lecture settings effectively to promote student abilities to question, reason, and communicate ? What types of changes do biology professors and their graduate students go through as they attempt to make their teaching more student-centered? How do university professors develop reflective teaching practices? What types of mentorships/partnerships are effective professional development models for other professors and their graduate students? This study has received seed funding and support from the National Science Foundation (NSF) through the Maryland Collaborative Teaching Project. The study is underway and the first semester trial has been completed. The intention is to follow on with the students involved in the first semester trial and to teach the course for the next three years using the same approach. At this time, the study requires additional funding to facilitate the timely analysis of data, provide for second trial instructional needs, and establish an "in-house" support base that can be used to attract other funding. A preproposal for additional funding has been submitted to the Fund for the Improvement of Post-Secondary Education (FIPSE). The support from UMBC will provide needed follow-on and matching support. The project is requesting the maximum SRIS one-year funding ($10,000) to use for equipment, data analysis; and a graduate assistant to provide research and evaluation support.

Submitted by
Susan M. Blunck
Department of Education

Narrative

The problem today is that students are passive - they aren't thoughtfully engaged in the learning process (APA, 1991; NRC, 1996; AAAS, 1989, 1993) Those students who do not fit the traditional stereotype of a good science student are overwhelmed rather intrigued with introductory science experiences (AAAS, 1989, 1993; Blunck, 1993; NRC, 1996; Yager, 1991). Instruction at the undergraduate level tends to promote the "give and receive", passive mode of teaching and learning (AAAS, 1989, 1993; Yage, 1991). Realizing that the large lecture courses will continue to exit, this comparison study is one of the first in the nation to attempt to study the effects of student-centered postsecondary instruction using a comparative research design. The emerging National Science Education Standards (1996) address the need to thoughtfully examine our teaching practices at all levels. The thrust of major reform efforts in science education are promoting the teaching and learning of science in the context of human experience. Students should be challenged to apply what they learn in introductory science courses as soon as possible (AAAS, 1989, 1993; NRC, 1990, 1996). The ability to pose and evaluate researchable questions should be valued and take high priority at all levels in science education (NRC, 1990, 1996).

Toward 2000: The Evolution of Students and their Professors in Introductory Biology is a study designed to test a number of questions related to making introductory "gateway" biology courses more engaging for students. This comparison study is testing whether biology students in active learning situations with pedagogical savvy science professors have advantages over students in traditional lecture settings. It is providing insights on the teacher change processes accompanying teaching research. This comparison study is examining the impact of student-centered teaching models in a large introductory science course (Biology 100). The study is underway and the first semester trial has been completed. The intention is to follow on with the students involved in the first semester trial and to teach the course again for the next three years using the same approach.

This study is contributing to the research base for post-secondary science teaching by:
-Providing a perspective on the teacher change process accompanying teaching research at the university level;
-Providing models for other professors/graduate students as begin their own teaching research;
-Providing models for teaching that will move us beyond the lecture mode at the university and college levels;
-Test whether students in active learning settings with pedagogically savvy science professor have any advantage over students in traditional lecture settings.

The primary objectives of the research project are to test a variety of teaching approaches known to promote active student learning in small classes (50 or fewer students) in a large introductory lecture course in an attempt to improve students' ability to question and reason

scientifically. The project is concerned with not only measuring the changes that result in students, but in analyzing the processes of change that professors and graduate students move through in trying to implement these practices. Both long and a short term effects related to these objectives will be measured using qualitative and quantitative evaluation techniques. A constant comparative method will be used throughout the study to analyze issues related to the key research questions.

The course, Concepts of Biology, has been regularly taught by one of the PIs (P.G. Sokolove, Professor of Biological Sciences, Ph.D., Biophysics, Harvard, 1969) over the past 20 years. It is a one-semester, 4-credit (3 hours lecture, 1 hour discussion per week) course designed mainly for students majoring in biology or biochemistry, and for students in biomedically-related, pre-professional programs such as medicine, dentistry and physical therapy. However, it is also taken by many non-science majors (20-30%). Enrollment is roughly 440 students in the Fall and 250 in the spring. Higher-level courses in the biology major sequence require this course as a pre-requisite. In past years, the course has been team-taught by up to three faculty members with complimentary research interests. Dr. Sokolove will be the only instructor in one section of this course (ca. 240 students) each Fall throughout the 3-year duration of the project. Comparison sections (approx. 200 students) will be taught in the Fall by an experienced instructor (Dr. D. Flaim) who will teach the course in traditional fashion as he has for the past three years and an additional section that will be team taught during the spring semester. Examples of instructional approaches being used in Dr. Sokolove's comparison section include (but are not limited to) cooperative learning techniques, methods derived from constructivist learning theory and in-class, question/response exchanges with attention to longer wait times, writing projects.

The collaborating PI (S. Blunck, Assistant Professor of Education, Ph.D., University of Iowa, 1993) is a specialist in science education who joined the UMBC faculty in summer 1995. Dr. Blunck has extensive K-16 teaching experience and has helped direct and evaluate major constructivist reform efforts in science education throughout the country. She functions as a mentor, instructional advisor, observer, and evaluator for the project. Dr. Blunck will guide the formative and summative evaluation processes.

Being aware that this is an ambitious undertaking, a preliminary trial has been completed this semester (Fall 1995) with existing resources and limited external support. Students have been organized into cooperative learning teams of 3-4 students. The results of our efforts to promote both group-based and individual student participation in a large lecture setting have been encouraging. Students in the course are encouraged to share their questions and insights during class sessions. The preliminary trial has been enlightening. Some obvious needs have been identified that, if met, will enhance our efforts both to reform introductory biology, to document changes across years, and to communicate the results of the project to others. Hand-held microphones are needed to improve the discourse dynamic in the course and edited video tapes are needed to illustrate key teaching strategies.

The project will continue to be focused on documenting the change processes from the perspective of the instructors and students involved in the course and to note the impact that

the project is having on other faculty and graduate students in the department. It is clear that the research-oriented faculty in this and other departments are curious about proposed reforms in science education, but do not yet realize how efforts to modify their teaching might also incorporate a significant (and valuable) research component. By demonstrating how research can be directly linked to instructional reform, the proposed project will encourage others to participate in the improvement of teaching and will elicit strong institutional validation and reward of such efforts. Thus, one aim of the project will not be directly to promote faculty development and an emphasis on teaching as separate from UMBC's research mission, but rather to show by example and dissemination how creative development of new and more effective teaching methods can be done within a traditional research context.

The research design is blending ethnographic and statistical methodologies to evaluate the project goals. Dr. Blunck is advising on the instructional design and coordinating data analysis. Students, professors, and graduate students are involved in journaling, interviews, class and coaching discourse, focus group discussions, and written surveys to document the various dimensions of the change process. A variety of authentic student assessments are being used to document student understandings. These include exams, lab journals, individual and groups projects. In both the "experimental" and comparison sections students are being surveyed to determine their science backgrounds and to gauge pre- and post-course their level of confidence in their ability generally to handle science courses. Videotapes are being recorded of all sections throughout the semesters to document frequency and quality of student responses, frequency and sophistication of students' questions, interaction patterns, effectiveness of teaching strategies. Based on evaluations during the semester and across years, teaching approaches are likely to be modified, and changes that should accompany such modification will be documented. Comparison of performance on identical questions on exams in the comparison sections are being used to assess content knowledge and retention of the students.

To fully implement our plans, a graduate assistant will be needed in addition to the two regularly assigned by the department. This person will serve as an research specialist with the study helping analyze and collect data. The two students provided by the Biology Department are responsible for teaching the discussion sections.

Preliminary results of the first teaching trial will be shared at the National Science Teachers Conference in St. Louis, MO this spring. Other biology professors in the UMBC department have expressed interest in hearing more about the changes taking place in this course. The impact of this type of instruction on students/professors may not be realized immediately; thus the need for the follow-up component to this study. The project has received favorable attention from the Maryland Collaborative Teaching Project (MCTP) and is being showcased as one of their most promising research studies. The funding received to date through the MCTP project has been limited and used as seed money with the expectation that matching funds will be needed to help carry the study forward. MCTP will continue to support the study but there is a much greater chance of gaining additional support through MCTP and other agencies if this research project can gain additional support from UMBC.

References

AAAS (American Association for the Advancement of Science). 1989. Science for all americans. New York: Oxford University Press.

AAAS (American Association for the Advancement of Science). 1993. Benchmarks for science literacy, New York: Oxford University Press.

APA (American Psychological Association). 1991. Learner-centered psychological principals: Guidelines for school redesign and reform. Washington: DC: Author.

Blunck, S.M. Evaluating the effectiveness of the Iowa Chautauqua science inservice program: Changing teacher confidence concerning reculturing behaviors. Unpublished doctoral dissertation, The University of Iowa, Iowa City, Iowa.

Bybee, R.W. 1993. Reforming science education: Social perspectives and personal reflections. New York: Teachers College Press.

Goodlad, J.I. 1994. Educational renewal: Better teachers for better schools. San Franciso: Jossey-Bass.

Hargreaves, A. and M. Fullan. eds. 1991. Understanding teacher development. London: Cassell.

NRC (National Research Council). 1990. Fulfilling the promise: Biology education in the nation's schools. Washington: Author.

NRC (National Research Council). 1996. The national science education standards. Washington: Author.

Schon, D. 1987. Educating the reflective practitioner. San Fransico: Josey Bass.

Yager, R.E. 1991. The constructivist learning model: Toward real refrom in science education. The Science Teacher, 58(6), 52-57.

NAME Susan M. Blunck

BIOGRAPHICAL SKETCH

Please provide a biographical sketch in the following format

NAME	POSITION	BIRTH DATE
Susan M. Blunck	Assistant Professor Science Education	7/19/50

EDUCATION

INSTITUTION & LOCATIONS	DEGREE	YEAR CONFERRED	FIELD OF STUDY
Univ. of Iowa/Iowa City,IA	BA	1972	Education - Science Education
Univ. of Iowa/Iowa City,IA	BS	1988	
Univ. of Iowa/Iowa City,IA	Ph.D	1993	

RESEARCH AND PROFESSIONAL EXPERIENCE

List previous employment, experience, and honors. Include present membership on Federal advisory committees. List titles and complete references of all publications and scholarly accomplishments during the last three years and representative earlier work pertinent to this application. DO NOT EXCEED TWO PAGES.

See attachment (2 pages)

SUSAN M. BLUNCK

Assistant Professor/Science Education

CURRENT POSITION:

Assistant Professor Science Education
The University of Maryland Baltimore County (UMBC)
Baltimore, MD 21228

TEACHING AND RESEARCH EXPERIENCES:

1995-present	Assistant Professor Science Education University of Maryland Baltimore County Baltimore, MD
1990-1995	Associate Director The University of Iowa The Iowa Chautauqua Program (ICP) Science Education Center Iowa City, Iowa

EDUCATIONAL BACKGROUND:

1993	**Ph.D.**	The University of Iowa Education (Science Education/Curriculum)
1988	**M.S.**	The University of Iowa Science Education
1972	**B.A.**	The University of Iowa Early Childhood & Elementary Education

SPECIALIZATIONS:

Elementary/middle school science education - curriculum integration - school reform - Science/Technology/Society (STS) teaching strategies - Teacher development/leadership (preservice & inservice) - Cognitive and social constructivist teaching, learning, and assessment practices - School/university partnerships - Educational communication and technology - History and philosophy of science - Community building and systemic change - Grant writing - Alternative assessment - Elementary & middle school curriculum design/evaluation - Action research - Elementary administration

PROFESSIONAL DISTINCTIONS - AWARDS - GRANTS

Phi Delta Kappa - (1989)
Pi Lambda Theta - (1989)
Iowa Chamber of Commerce - Executive Endorsement of Excellence
Governor's Award for Exemplary Educational Business/Industry Partnerships
Silver Philo Award - Excellence in Educational Video Tape Production - International Television Association (video tape sent upon request)
Writing Award - International Television Association (video tape sent upon request)
2 National Science Foundation (NSF) Teacher Enhancement Grants
4 State Eisenhower Teacher Enhancement Grants
1 State Lottery Teacher Enhancement Grant
3 Business/Industry Grants
2 Environmental Protection Agency (EPA) Grants
1 Annenberg Foundation Grant
2 US. Department of Education Grants - National Diffusion Network (NDN)

SELECTED PUBLICATIONS:

Yager, R.E. & Blunck, S.M. (1991). The Iowa Chautauqua Program. Iowa Educational Leadership, 7(2), 65-69.

Yager R.E., Kellerman, L., & Blunck, S.M. (1992). The Iowa assessment handbook. Iowa City, IA: The University of Iowa, Science Education Center.

Yager, R.E., Mackinnu, Blunck, S.M. (1992). Science, technology, society as reform in science in the elementary school. Journal of Elementary Science Education. 4(1):1-13.

Blunck, S.M., Giles C.S., & McArthur J.M. Gender differences in the science classrooms: Bridging the gap. (1993). In What research says to the science teacher (Vol 7): The science, technology, and society movement, R. E. Yager (ed). Washington, DC. National Science Teachers Association.

Yager R.E., Liu, C.T., Blunck S.M. (1993). The Iowa Chautuauqua Program: Annual Assessment Report 1992-93. Iowa City, IA: The University of Iowa, Science Education Center.

Yager, R. E. , Blunck, S. M., & Nelson, E.T. (1993). The use of computers to enhance science instruction in pre-school and K-3 classrooms. Journal of Computing in Early Childhood Education, 4(2): 125-136.

Yager, R. E., Blunck, S. M. & Dunkel, J. (1994). Assessment results with the science/technology/society approach. Science and Children, 32(2):34-37.

Blunck, S. M. & Yager, R. E. (in press). The Iowa chautauqua program: A proven in-service model for introducing STS in K-12 classrooms. In R.E. Yager (Ed.), Science/technology/society as reform in science education: Evidence that reform occurs with STS. Albany, NY: State University of New York Press.

Koch, J., & Blunck, S. M. (in press). Breaking the mold: Celebrating individual differences in the science classroom. In R. E. Yager (Ed), Science/technology/society as reform in science education: Evidence that reforms occurs with STS. Albany, NY: State University of New York Press.