National Institute
of Environmental Health
Sciences

Environmental Health Sciences as an Integrative Context for Learning

Grantee Meeting
May 8-10, 2002

Hosted by the
Environmental and Occupational Health
Sciences Institute
University of Medicine and Dentistry
of New Jersey School of Public Health

Piscataway, New Jersey

Introduction: K-12 Education at the National Institute of Environmental Health Sciences

The National Institute of Environmental Health Sciences supports an array of environmental health science education activities through a variety of extramural and intramural programs. The purpose of these initiatives is to help individuals better understand the effects and risks to human health from physical and social factors. These initiatives stem from the NIEHS' recognition that the lay community requires greater knowledge about environmental health issues as they are increasingly challenged to make decisions on the risks and benefits of agents that permeate society. In addition, the NIEHS sees these programs as an investment in the future of our society and the environmental health sciences.

Extramurally, there are two programs with a major emphasis in K-12 environmental health science education. NIEHS began the first program, ***K-12 Environmental Health Science Education***, in 1993. There have been three initiatives within the program. The first, Instructional Material Development, supported the creation of instructional materials at all grade levels. These projects provided instructional materials that can be infused into existing curricula and to develop interesting and challenging materials for students. Grantees used a variety of media, appropriate for the intended audience, to address such topics as cell biology, toxicology, risk assessment, scientific process and methodology, and indoor and outdoor air pollution.

The second initiative, Teacher Enhancement and Development, supported projects to develop and implement teacher enhancement and development activities. The goals of this program were to: 1) enhance dissemination, utilization, and effective implementation of materials and curricula pertaining to environmental health science; 2) provide teachers with the disciplinary and pedagogical skills necessary for teaching environmental health science; and 3) link researchers in environmental health science with teachers at the K-12 level. Grantees within this initiative have trained more than 7,500 teachers around the U.S. to incorporate environmental health science education into their classroom.

Finally, the third, and most innovative initiative, Environmental Health Sciences as an Integrative Context for Learning, encourages partnerships between environmental health scientists, educators, and state departments of education with the goal of integrating environmental health sciences within a variety of curricula (e.g. geography, history, math, art). The purpose is to improve overall academic performance as well as enhance students' comprehension of and interest in environmental health sciences.

The second major extramural program, ***Community Outreach and Education Program (COEP)***, is a component of the NIEHS Core Center Program – a program that seeks to enhance environmental health science research by supporting research facilities at research intensive universities. The purpose of COEP is to translate basic research emanating from the Centers into knowledge that can be applied to public health. COEPs

perform this work in a variety of manners, including K-12 environmental health science education. COEPs develop educational curriculum in a vast array of topics, including, basic toxicology, carcinogenesis, nutrition, and cell biology.

Intramurally, NIEHS has two principal programs in K-12 environmental health science education. The first, ***BEST*** (Bridging Education Science and Technology), is a partnership between NIEHS and local Durham, North Carolina Public schools. The program introduces high school students, predominantly underrepresented minority and economically disadvantaged, to standard molecular biological research technologies used in biological/biomedical science. This program has resulted in motivating students and enhancing their interest in science.

The second program, ***Summers of Discovery***, recruits a diversity of secondary and post-secondary students, and teachers to work at NIEHS for a summer. This 10-12 week program exposes students and teachers to environmentally based biomedical research by placing them in a NIEHS research laboratory with one-on-one mentoring under an Institute scientist. In addition to receiving hands-on research experience in the laboratory, participants attend weekly seminars and discussion groups, and presentations by other students.

More information on these programs can be found on the NIEHS web site at:
http://www.niehs.nih.gov/dert/programs/translat/k12/k12educa.htm

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Purpose of Meeting

Now that the EHSIC projects have had a year to develop, this meeting will move beyond basic project introductions. Participants will learn about and discuss:

- Student and project evaluation strategies and rubrics
- Federal science education policies
- Ethics and education

Participants will also:

- Share their progress to date during a poster session that will focus on how the projects are integrating environmental health sciences into their target subject areas.
- Tour Lynn Crest Elementary School, where the project at EOHSI/UMDNJ is being implemented.

K-12 Education:
Environmental Health Sciences as an Integrative Context for Learning

Annual Grantee Meeting

May 8-10, 2002

Hosted by the Resource Center
Environmental and Occupational Health Sciences Institute
University of Medicine and Dentistry of New Jersey-School of Public Health
Piscataway/New Brunswick, New Jersey

Wednesday, May 8, 2002 **Hyatt Regency, New Brunswick, NJ**

6:00 pm **REGISTRATION**

7:00 pm **OPENING REMARKS**
Frederick L. Tyson, Program Administrator, Chemical Exposures and Molecular Biology, Division of Extramural Research and Training, National Institute of Environmental Health Sciences

7:20 pm **WELCOME**
Anne P. Sassaman, Director, Division of Extramural Research and Training, National Institute of Environmental Health Sciences

7:30 pm **SESSION 1: FEDERAL SCIENCE EDUCATION POLICY**
Betty J. Eidemiller, Director of Education, Society of Toxicology and Executive Director, Toxicology Education Foundation
"No Subject Left Behind? Science Education in the Era of Mandated School Testing"

8:00 pm **DISCUSSION**

8:30 pm **ICE-BREAKER**
Laura Hemminger, Director Resource Center, Environmental and Occupational Health Sciences Institute, UMDNJ/Rutgers

9:00 pm **CONCLUDE SESSION**

Thursday, May 9, 2002 **EOHSI/UMDNJ-SPH**

8:00 am	Early bird shuttle	
8:30 am	Depart hotel	
9:00 am	**WELCOME**	Robert Snyder, Director EOHSI
9:10 am	**RECAP OF ICEBREAKER**	Laura Hemminger
9:15 am	**SESSION 2: STUDENT ASSESSMENT/EVALUATION** *Presentation: "Response of Curriculum Development Programs to State and Commercial Assessment*" Arthur Mitchell, New Jersey Department of Education *Panel Discussion:* Jodie Haney, Lynn Waishwell, Kendra Mingo, Roy Beven *Testing Tools*	
11:20 am	**EVALUATION PLANS**	
11:40 am	**NIEHS K-12 WEBSITE**	Liam O'Fallon, NIEHS
12:00 pm	**LUNCH**	
12:30 pm	**EHSIC SCHOOL VISIT** **Lynn Crest Elementary School, Woodbridge, NJ**	
3:00 pm	**SESSION 3: EVALUATION RUBRICS** *Presentation: "Alignment of System Elements with Educational Goals: Effective Use of Rubrics"* Joseph D. Exline, Exline Consulting Services	
5:00 pm	**CONCLUDE SESSION**	
5:30 pm	**POSTER SESSION/RECEPTION**	
6:30 pm	**DINNER** *sponsored in part by the Environmental and Occupational Health Sciences Institute, UMDNJ/Rutgers*	
8:00 pm	**RETURN TO HOTEL**	

Friday, May 10, 2002 **EOHSI/UMDNJ-SPH**

8:00 am Early bird shuttle
8:30 am Depart hotel

9:00 am **SESSION 4: ETHICS AND EDUCATION**
Presentation: "Ethics in K-12 Environmental Health Science Education"
Kelly Fryer-Edwards, University of Washington
Panel Discussion:

Ken Goodman	Panel Moderator
Pat Walsh	Scientist's Viewpoint
Nancy Moreno	Elementary/Middle School Viewpoint
Laura Hemminger	Elementary/Middle School Viewpoint
Lisa Pitman	High School Viewpoint

Interactive Case Study

12:00 pm **FUTURE DIRECTIONS** Frederick L. Tyson

12:30 pm **LUNCH/ADJOURN**

EOHSI is jointly sponsored by UMDNJ-Robert Wood Johnson Medical School and Rutgers, The State University of New Jersey. UMDNJ-SPH is sponsored by UMDNJ in cooperation with Rutgers, The State University of New Jersey and the New Jersey Institute of Technology and in collaboration with the Public Health Research Institute.

Session 1: Federal Science Education Policy

As the landmark No Child Left Behind legislation is implemented, science educators are looking for a toehold to ensure that children are not denied an understanding of science basic to our lives in our modern world. The act eliminated many previous teacher development programs, and 26 of the programs that were included were dropped from the 2003 budget. In addition, many experts are concerned about measuring education quality solely by scores on high stakes state tests in reading and math. Implementation of such testing strongly drives school and teacher behavior to the detriment of a broader array of learning and content objectives. States will struggle to meet the new requirements amid increased financial pressures. Science could fall along the wayside, especially in the critical lower grades.

This presentation will provide an overview of new federal education policy and funding avenues, and include discussion of how we can work within this new framework to support our objectives of science education reform and increased understanding of environmental health concepts. Great strides have been made in the teaching of science, in no small part due to the infusion of targeted funds from the Eisenhower program, NIEHS, and other critical supporters of curriculum and teacher development. Sustained efforts are critical to truly make sure that no child is left behind by the omission of quality science instruction.

BETTY EIDEMILLER, PH.D. BIOSKETCH

Betty Eidemiller is the Director of Education for the Society of Toxicology and the Executive Director for the Toxicology Education Foundation. She oversees K-12 oriented programs including a teacher workshop at the SOT annual meeting and a special program for undergraduates under-represented in the sciences, as well as other student and education activities. Previously she was Manager of Undergraduate Faculty and K-12 Programs at the American Society of Microbiology. However, the majority of her professional career has been as a faculty member teaching undergraduate biology at several institutions. At Lamar University in Texas she also directed a number of grants for K-12 teacher professional development. Her Ph.D. in Ecology and Evolutionary Biology is from the University of California, Irvine.

Session 2: Student Assessment/Evaluation

Schools and districts adopt materials that they believe will help raise student achievement and encourage academic growth and development. When curricular materials are being developed, the developers must be ready to explain how success in their program will be measured. Because there is an increasingly great focus on student achievement on state and commercial assessment tools, curricular materials should be responsive to one or more of these assessments.

ARTHUR MITCHELL BIOSKETCH

Mr. Mitchell currently serves as the Science Coordinator in the Office of Standards & Assessments for the New Jersey Department of Education.

Session 3: Evaluation Rubrics

It is advocated that the main problem with increasing the effectiveness of public education is the fact too little attention is given the alignment of systemic elements (instructional resources, professional development, leadership, and so forth) with the goals set for students to achieve. New learning outcomes are introduced into an old system, which "effectively chews them up and spits them out", resulting in little or no change in student outcomes.

This discussion will focus on the necessitation of clearly understanding student outcomes for modern society and how rubrics and other methods can be used to effectively align systemic elements with student outcomes to produce successful results. A brief discussion of the method for developing rubrics will take place and participants will be given a fully developed rubric for the evaluation of instructional resources for their inquiry potential. Participants will have the opportunity for a "minds & hands on" experience with a rubric in the examination of instructional resources. Time will be allotted for questions and a discussion of the workshop.

JOSEPH D. EXLINE, PH.D. BIOSKETCH

Joseph D. Exline received his bachelors degree from **Glenville State College (1960**), his masters degree from **Ohio State University (19968)**, and his doctorate from the **University of Maryland (1973).** His undergraduate and graduate degrees include majors in the field of biology, earth science, and social studies.

His teaching experience spans the range from upper elementary school through graduate level college courses. He was employed as a **biology and earth science teacher** with Fairfax County Schools (Virginia) from 1962 to 1974. Exline joined the Virginia Department of Education in 1974 as Assistant State Science Supervisor. He was appointed **Director of Science in 1978**, with responsibility for overseeing the statewide K-12 science program and served in that capacity until 1991. In June 1991, Exline was appointed to the effort to develop the state's Statewide Systemic Initiative by Secretary of Education, James Dyke. He was appointed **Principal Investigator and Project Director** for the statewide systemic initiative, Virginia Quality Education in Sciences and Technology (V-QUEST) when it was funded in 1992. He directed this effort, until June 1995, at which time he took the Governor's early retirement offer, a move to downsize state government.

Dr. Exline is now President of the **Exline Consulting Services,** formed in 1987, which is involved in consulting in broad aspects of educational reform and especially with widespread community involvement in educational improvement. He has over twenty years experience, being one of the pioneers, in educational system analysis and building environments for active student learning. In addition, he served briefly as Vice-President for Research & Development with the **OptiCom Group,** a company focused on bringing accountability to education in terms of customer, product, and system.

Session 4: Ethics and Education

Ethics can serve as a bridge between the sciences and humanities within any curriculum. Students across an age spectrum can appreciate questions of fairness and responsibility when presented with engaging problems and issues. Ethics can serve an important role in K-12 education by introducing students to some of the social complexities that accompany the use of scientific technology. The field of Environmental Health, in particular, lends itself to the inclusion of ethics as issues of environmental justice, fairness, individual and community responsibility are pervasive. Integrating ethics discussions with science curricula can help foster critical thinking and engagement with issues all citizens will face, regardless of profession.

I present a framework for helping students and teachers think about the practice of ethics as including several facets. I emphasize skills in the areas of learning to **recognize ethical issues** when they arise**, developing reasoning** to work through ethical issues**, motivating ethical responses** (e.g. why it is my responsibility to act), and cultivating the skills to carry out **action**. Tools and resources developed in other settings for social justice or ethics education can be adapted to the K-12 classroom, building on goals central to the NIEHS Center initiatives. Teaching ethics can be case-based, hands-on, integrative, and standards-based (a plus for teachers).

KELLY FRYER-EDWARDS, PH.D. BIOSKETCH

Kelly Fryer-Edwards, Ph.D., is an Assistant Professor in the Department of Medical History and Ethics at the University of Washington School of Medicine. Her training is in Medical Ethics and Philosophy of Education. She teaches and develops curriculum in ethics and professionalism for medical students, residents, and faculty development. Dr. Fryer-Edwards has also served as a curriculum advisor and project co-director for two HRSA contracts to develop genetics curriculum for primary care physicians. She has recently joined the faculty at the Institute for Public Health Genetics and the ELSI Core for the Center for Ecogenetics and Environmental Health at the University of Washington.

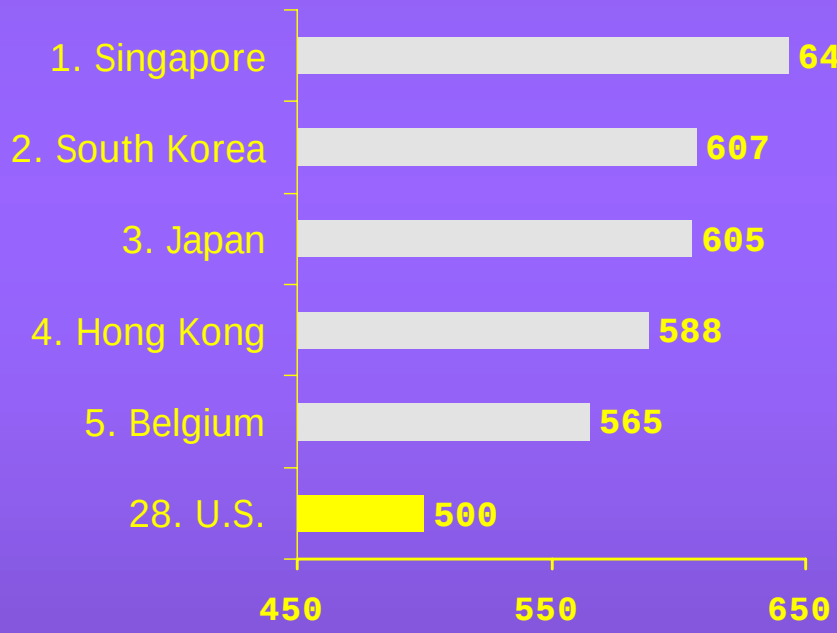
Evaluation Plans

NIEHS K-12 Website

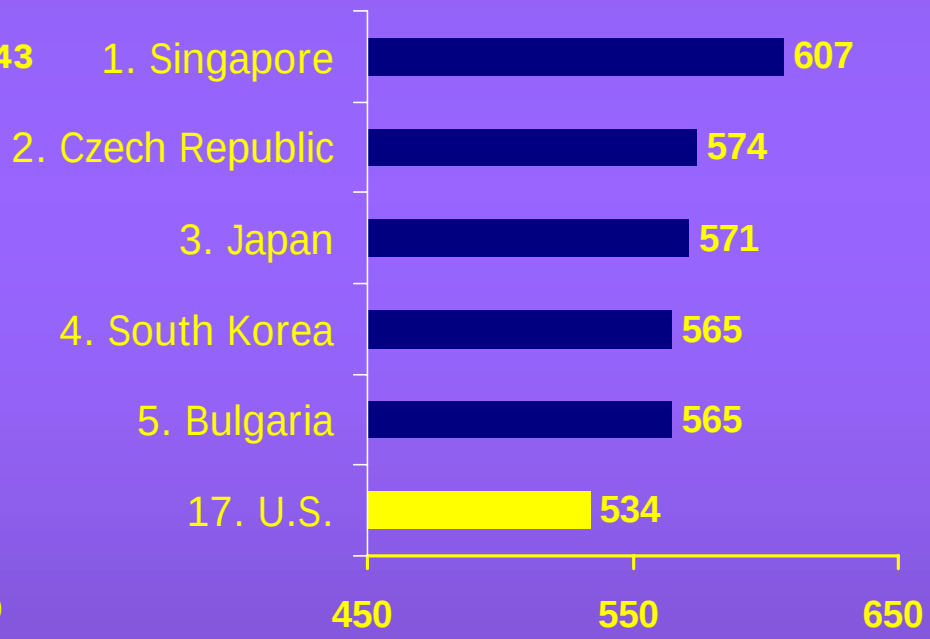
Future Directions

International Math and Science Proficiency Scores 8th Grade

Math



Science



Source: International Association for the Evaluation of Educational Achievement, Third International Mathematics and Science Study (TIMSS), 1994-95.

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