



Organized to improve science  
teaching — through research.

**57th ANNUAL MEETING**  
**The Monteleone Hotel**  
**New Orleans**  
**April 27-30, 1984**

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## **Description of the 1984 NARST Annual Meeting**

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The centerfold page illustrates the structure of the annual meeting. For additional information, registrants are encouraged to visit the information-registration desk.

## **Participant Index**

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**Please Note**

Repeatedly, NARST members have indicated that the opportunity for discussion and audience interaction with the presenters is extremely valuable. It is the responsibility of persons conducting seminars, workshops, panels, and symposia to provide such opportunities. Also, presenters of contributed papers should **limit the presentation to 10 minutes**, allowing 5 minutes for questions, discussion, and interaction. If possible, include details of data collection, analyses, reference, etc. in a paper prepared for distribution at your session. Presiders will be asked to be firm in holding presenters to time limits in order to allow for discussion in all sessions.

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This program booklet was prepared by the program committee and the secretarial staffs at the University of Virginia and at the University of Calgary. Printed in Canada.

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# NARST OFFICERS

**1983-84**

**1982-83**

## **PRESIDENT**

*Ann C. Howe*  
*Department of Math and Science Education*  
*North Carolina State University*  
*Raleigh, NC 27650*

## **PRESIDENT-ELECT**

*Ertle Thompson*  
*Ruffner Hall*  
*University of Virginia*  
*Charlottesville, VA 22903*

## **IMMEDIATE PAST-PRESIDENT**

*Carl F. Berger*  
*School of Education*  
*University of Michigan*  
*Ann Arbor, MI 48109*

## **BOARD MEMBERS**

*Glen Aikenhead*  
*Education*  
*University of Saskatchewan*  
*Saskatoon, Sask. S7N 0W0*

*Rodger Bybee*  
*Education Department*  
*Carleton College*  
*Northfield, MN 55057*

*Linda R. DeTure*  
*School of Education*  
*Rollins College*  
*Winter Park, FL 32789*

*Jane B. Kahle*  
*Department of Biological Sciences*  
*Purdue University*  
*West Lafayette, IN 47907*

**RESEARCH COORDINATOR**

*Rodney L. Doran  
553 Baldy Hall  
SUNY at Buffalo  
Amherst, NY 14260*

**EDITOR, JOURNAL OF RESEARCH IN  
SCIENCE TEACHING**

*James A. Shymansky  
Science Education Center  
University of Iowa  
Iowa City, IA 52242*

*Marcia C. Linn  
Lawrence Hall of Science  
University of California  
Berkeley, CA 94720*

*Russell H. Yeany  
Science Education Department  
University of Georgia  
Athens, GA 30602*

*Robert B. Sigda, ex officio representative  
National Science Teachers Association  
1742 Connecticut Avenue, N.W.  
Washington, DC 20009*

**EXECUTIVE SECRETARY:** *William G. Holliday, NARST-EDCI, University of Calgary, Calgary, Alberta, CANADA T2N 1N4*

## PRESIDENTS OF NARST

1928 W.L. Eikenberry  
1929 W.L. Eikenberry  
1930 W.L. Eikenberry  
1931 Elliot R. Downing  
1932 Elliot R. Downing  
1933 Francis D. Curtis  
1934 Ralph K. Watkins  
1935 Archer W. Hurd  
1936 Gerald S. Craig  
1937 Walter G. Whitman  
1938 Hanor A. Webb  
1939 Ralph Power  
1940 Otis W. Caldwell  
1941 Harry A. Carpenter  
1942 G.P. Cahoon  
1943 Florence G. Billig  
1944 Florence G. Billig  
1945 Florence G. Billig  
1946 C.L. Thield

1947 Earl R. Glenn  
1948 Ira C. Davis  
1949 Joe Young West  
1950 N. Eldred Bingham  
1951 Betty Lockwood  
1952 Betty Lockwood  
1953 J. Darrell Barnard  
1954 George C. Mallinson  
1955 Kenneth E. Anderson  
1956 W.C. VanDeventer  
1957 Waldo W. Blanchet  
1958 Nathan S. Washton  
1959 Thomas P. Faser  
1960 Vaden W. Miles  
1961 Clarence H. Boeck  
1962 Herbert A. Smith  
1963 Ellsworth S. Obourn  
1964 Cyrus W. Barnes  
1965 Frederic B. Dutton

1966 Milton O. Pella  
1967 H. Craig Sipe  
1968 John M. Mason  
1969 Joseph D. Novak  
1970 Willard D. Jacobson  
1971 Paul D. Hurd  
1972 Frank X. Sutman  
1973 J. David Lockard  
1974 Wayne W. Welch  
1975 Robert E. Yager  
1976 Ronald D. Anderson  
1977 O. Roger Anderson  
1978 Roger G. Olstad  
1979 James R. Okey  
1980 John W. Renner  
1981 Stanley L. Helgeson  
1982 Stanley L. Helgeson  
1983 Carl F. Berger  
1984 Ann C. Howe

## EMERITUS MEMBERS

Kenneth A. Anderson  
N. Eldred Bingham  
Paul Blackwood  
George T. Davis  
T. Handley Diehl  
Frederic B. Dutton  
Thomas P. Fraser  
Ralph P. Frazier  
Harvey J. Goehring  
Paul D. Hurd  
James R. Irving  
Ralph W. Lefler  
Ben Levine  
John M. Mason  
Lester Mills

Clarence H. Nelson  
Milton Pella  
Ruth L. Roche  
Sidney Rosen  
Herman Schneider  
Robert Stollberg  
Nathan S. Washton  
Fletcher G. Watson  
Allen D. Weaver

## LIFE MEMBERS

Clarence E. Baer  
Lois M. Shoemaker  
H. Craig Sipe

## GENERAL INFORMATION

THE NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING (NARST) was founded in 1928 for the purpose of promoting research in science education at all educational levels, and of disseminating the findings of this research in such ways as to improve science teaching. The Association was incorporated as a nonprofit corporation in the State of Minnesota.

The official publication of the Association is the **Journal of Research In Science Teaching**.

NARST encourages the presentation of a wide variety of scholarly papers reporting investigations in all aspects of science education, including "action", historical, philosophical, ethnographic, and evaluative studies as well as reports of empirical research and critical reviews.

Reports of experimental and analytical studies on theoretical and applied issues, of course, are encouraged.

Some of the research areas of interest to NARST include curriculum development and organization, evaluation, learning theory, teacher education, programs for the talented and the handicapped, and methods of instruction in science. The Association cooperates with the ERIC Clearinghouse for Science, Mathematics, and Environmental Education (SMEAC) located at The Ohio State University to conduct and publish reviews of research in science education at the elementary, secondary and college levels and to compile and publish the abstracts of papers presented at the annual meeting.

The constitution of the Association specifies that membership shall be drawn from people interested in research in science education and from people outstanding in science education leadership, including teachers, supervisors and curriculum developers. Patron membership is available to individuals and organizations who wish to contribute more than the basic dues to support the work of our organization.

Members of NARST (on per capita basis) have influenced more curricular changes and teaching practices in science education (elementary, secondary, and post-secondary) than any other group of people. We invite you to join us.

The Association's headquarters (1981-1985) is located in the Department of Curriculum and Instruction, University of Calgary, Calgary, Alberta, Canada T2N 1N4 (telephone: 403-284-7485). Inquiries regarding Association matters should be directed to the Association's Executive Secretary, Dr. William G. Holliday. (Contributions to NARST by the University of Calgary were estimated at well over \$30,000, in US funds, during the fiscal year of 1983.)

## HOW NARST KEEPS ITS MEMBERS INFORMED

Nine issues of the **Journal of Research in Science Teaching** - the best research journal in science education.

JRST has been ranked as one of the highest quality educational journals according to studies published by Ward, Holland and Schramm ( **American Educational Research Journal**) and Guba and Clark ( **Educational Researcher**) for the American Educational Research Association - AERA. These authors identified JRST as clearly the top research journal in science education.

Over 100 abstracts of research papers presented at our annual meetings.

Quarterly newsletters describing recent developments in research and in the profession.

Detailed Register-Directories (over 40 pages) describing the accomplishments and current research interests of NARST members.

Opportunities to work with prominent people throughout the world on research projects and with such affiliated organizations as the National Science Teachers Association (NSTA) and the American Association for the Advancement of Science (AAAS).

**Join your colleagues from around the world. Write or phone us for more information.**

# PROGRAM STRUCTURE OF ANNUAL MEETING

This description of program format and the following definitions are offered to clarify the structure of this program. In addition, all members are encouraged to make specific suggestions for modification of format or inclusion of topics in future meetings. Remarks to the officers of NARST are always a welcome means of bettering the Association.

- 1. GENERAL SESSIONS** - Researchers of national prominence are asked to address the NARST membership concerning topics and issues of general concern. Such analyses of where we have been and where we are going are features of the annual meeting.
- 2. CONTRIBUTED PAPERS** - Individual members share results of their research efforts with other members. A series of concurrent sessions where such Contributed Papers are scheduled represents a major part of the NARST meeting. Generally, such papers are restricted to a ten-to-fifteen minute presentation which includes audience questioning as well.
- 3. PAPER SETS** - Several related studies originating from a common research center or line of research can be structured as a set of from three to six separate but related reports. Such a grouping of papers often allows for common elements of design or approach to be presented once instead of several times.
- 4. SYMPOSIA AND PANELS** - Areas of current research or research needs are identified and papers prepared addressing defined issues. Persons with varying backgrounds, positions and research interests are included. In addition to presentations concerning research in a given area, interaction among the presenters, other discussants, and the audience is anticipated. Varying views, approaches, data reports, and interpretations are desired features for these sessions.
- 5. RESEARCH WORKSHOPS** - These sessions are devoted to topics of basic importance for conducting disciplined inquiry of particular types. They are to contain a thorough and sophisticated treatment of research techniques and methods, including training in procedures for those who attend the workshop.
- 6. POSTER SESSIONS** - These sessions provide an informal area to display ongoing or completed research. By means of visual displays presenters share ongoing or completed research with other members. Members are encouraged to observe the posters throughout the conference and attend the session that will be used to discuss the presenters' work. Follow-up sessions will be provided for members and presenters to continue their discussions.

## SELECTION OF PAPERS FOR PRESENTATION

The Call for Papers is included in a Newsletter (and, at the option of the Executive Secretary, a special mailing) to all members. The Call for Papers includes a questionnaire which serves as a cover sheet for multiple copies of a summary or other program feature. Such copies are not to include names of the investigators or other means of identification. These copies of the summaries are number-coded with the cover sheets being filed until after all program planning and summary evaluation has occurred.

Members of the Program Committee review each paper submitted for possible use on the program. The names of the contributors remain unknown to all persons making the ratings. The separate ratings are summarized and any disagreement among the raters is discussed and resolved. The names of those submitting proposals for Techniques and Procedures of Research, Symposia, and Panels are known to the Committee before final decisions are made, and the need to present a balanced program is necessarily taken into account.

### PROGRAM COMMITTEE

Rodney Doran, Research Coordinator, SUNY at Buffalo  
Eugene Gennaro (1985), University of Minnesota  
William Holliday, Executive Secretary, University of Calgary  
John Koran (1985), University of Florida  
William Leonard (1984), Louisiana State University

Ertle Thompson (1984), Chairperson, University of Virginia  
Sara Ulerich (1985), University of Oregon  
Victor Willson (1984), Texas A. & M. University  
John Wilson (1984), University of Iowa

# 1984 NARST 57th Annual Meeting

## FRIDAY, APRIL 27

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1:00 p.m. - 5:00 p.m.

MEETING OF THE BOARD OF DIRECTORS

Pontalba Room

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8:45 p.m. - 10:00 p.m.

REGISTRATION AND INFORMATION

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8:30 p.m. - 10:00 p.m.

SOCIAL HOUR (CASH BAR)

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8:30 a.m. - 10:00 a.m.

SESSION A-1

Queen Anne Room

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**SYMPOSIUM: ASSESSING COGNITIVE CONSEQUENCES OF COMPUTER ENVIRONMENTS FOR LEARNING SCIENCE:  
RESEARCH FINDINGS AND POLICY IMPLICATIONS**

Presider

*Burton Voss, University of Michigan*

Participants

*Marcia C. Linn*

*Walter Saunders*

*Lawrence Hall of Science, U.C. Berkeley, Berkeley, CA 94720*

*Charles Fisher*

*Ellen Mandinach*

*Far West Laboratory, 1855 Folsom St., San Francisco, CA 94103*

*Nicholas Burbules, University of Utah, Salt Lake City, UT 84112*

*Mary Budd Rowe, National Science Foundation, Washington, DC 20550*

**PAPERS: COGNITIVE STRUCTURE**

Presider

*Marvin F. Wideen, Simon Fraser University*

Contributed Papers

**A Comparison of Cognitive Development, Field Independence/Dependence Cognitive Style, and Academic Success of Baccalaureate Nursing Students**

*Dorothy J. Gosnell-Moses, 4322 S. Westberry St., San Antonio, TX 78228*

*James Barufaldi, Director, Science Education Center, Univ. of Texas, Austin*

**Assessing the Convergent and Discriminant Validity of Cognitive Structure Representations of Science Concepts**

*Ron Hoz, c/o L.E. Klopfer*

*Audrey B. Champagne*

*Leopold E. Klopfer*

*University of Pittsburg, 816 LRDC Bldg., Pittsburg, PA 14260*

**Mathematical Relations Between Science Reasoning Skills and Some Variables Associated with Rate of Information Acquisition**

*O. Roger Anderson, 525 W. 120 Street, New York, NY 10027*

*Judith Callaway, Teachers College Columbia and East Islip High School, East Islip, New York*

**Evaluating Instruction: The Hidden Conceptual Changes**

*Fred N. Finley, Science Teaching Center, Benjamin Bldg., University of Maryland, College Park, MD 20742*

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**8:30 a.m. - 10:00 a.m.**

**SESSION A-3**

**Iberville Room**

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**PAPER SET: THE DEVELOPMENT OF SCIENTIFIC LITERACY IN SECONDARY SCHOOLS**

Presider

*Joy S. Lindbeck, University of Akron*

Papers

**Task and Teacher Characteristics, Student Interest and Achievement in Seventh-Grade Life Science**

*John R. Mergendoller, Far West Laboratory, 1855 Folsom Street, San Francisco, CA 94103*

**Life Science Instruction and Its Relationship to Scientific Literacy at the Intermediate Level**

*Alexis Mitman, Far West Lab, 1855 Folsom Street, San Francisco, CA 94103*

**Opportunity Structures for Scientific Literacy at the Secondary School Level**

*Larry F. Guthrie, Far West Lab, 1855 Folsom Street, San Francisco, CA 94013*

**A Historical and Conceptual Analysis of Tracking in Science Curriculum**

*Donald Kauchak*

*Ken Peterson*

*Dept. of Education, University of Utah, Salt Lake City, UT 84112*

**PAPERS: SCIENCE TEACHING AS A CAREER**

Presider

*Mary Westerbeck, Long Island University*

Contributed Papers

Science Teaching as a Career Choice of Eighth Grade Students

*J. Steve Oliver, Office of Instructional Development*

*164 Psychology Blvd., University of Georgia, Athens, GA 30602*

*Norman D. Anderson, Dept. of Mathematics and Science*

*Education, North Carolina State University, Raleigh, NC 27607*

Undergraduate Science Majors: Factors Influencing Career Choice

*Veronica Reardon Mondrinos*

*George Pallrand*

*Science Education Dept., Graduate School of Education, Rutgers University, 10 Seminary Place, New Brunswick, NJ*

Reasons Potential Math and Science Teachers Choose Not To Teach; What It Will Take to Attract Them to Teaching Again

*Robert H. Evans, Box 7266 Reynolda Station, Wake Forest University, Winston-Salem, NC 27109*

Sense of Competence in Science as a Factor in the Career Decisions of Men and Women

*George E. DeBoer, Dept. of Education, Colgate University, Hamilton, NY 13346*

**SATURDAY, APRIL 28**

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**8:30 a.m. - 10:00 a.m.**

**SESSION A-5**

**Bonnet Carre Room**

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**SYMPOSIUM: A NATIONAL STUDY OF FACTORS RELATING TO THE RETENTION OF WOMEN IN SCIENCE**

Presider

*Barbara S. Spector, Florida International University*

Participants

*Jane Butler Kahle, 221 Chemistry Building, Dept. of Biological Sciences, Purdue University, West Lafayette, IN 47907*

*Marsha Lakes Matyas*

*Hee-Hyung Cho*

*216 Chemistry Bldg., Purdue University, West Lafayette, IN 47907*

*Exyie Ryder, Southern University, Dept. of Biological Sciences, Baton Rouge, LA 70813*

*Elizabeth Stage, University of California, Lawrence Hall of Science, Berkeley, CA 94720*

*Judith Meece, Purdue University, South Campus Courts, West Lafayette, IN 47907*

Discussant

*Patricia Blosser, Ohio State University*

**SATURDAY, APRIL 28**

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**10:15 a.m. - 11:15 a.m.**

**GENERAL SESSION I**

**Queen Anne Room**

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Presider

*Ann Howe, President*

Address

Science Education: Cognitive Research in Science Learning

*Lauren B. Resnick, Professor of Psychology and Co-Director of the Learning Research and Development Center, University of Pittsburg,  
Pittsburg, PA 15260*

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**11:30 a.m. - 12:30 p.m.**

**SESSION B-1**

**Queen Anne Room**

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**PAPERS: IMPROVING SCIENCE TEACHING**

Presider

*Clemencia Gonzalez, Long Island University*

Contributed Papers

**The Effects of the Science Methods Course on Students' Performance During Student Teaching**

*Marvin F. Wideen*

*Steve Olliver*

*Rod McVicar*

*Simon Fraser University, Burnaby, British Columbia, Canada V5A 1S6*

**Science Teachers' Beliefs About the Nature of Science and the Selection, Implementation, and Development of Instructional Tasks**

*Emmett Wright, Science Teaching Center, University of Maryland, College Park, MD 20742*

*Richard Duschl, Dept. of Curriculum & Instruction, University of Houston-Univ. Park, Houston, TX 77004*

**A Cost-Effectiveness Analysis of Interventions for Improving Science Education**

*Ronald D. Anderson, Campus Box 249, University of Colorado, Boulder, CO 80309*

## SATURDAY, APRIL 28

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11:30 a.m. - 12:30 p.m.

SESSION B-2

Blenville Room

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### Presider

*Mark Malone, Louisiana State University*

### Contributed Papers

**Reasons Given by Students For and Against the Further Study of Science Following Completion of a Two-Year High School Science Requirement as a Basis for Course/Curriculum Change**

*Khalil Y. Khalili*

*Orrin Gould*

*398 Education Bldg., University of Illinois, 1310 South Sixth Street, Champaign, IL 61820*

**Relationship Among Selected Variables and the Number of Science Courses Completed by Black High School Seniors**

*Ellen Osborne Goggins, Litchfield Middle School, 1540 Fairfax, Akron, OH 44313*

*Joy S. Lindbeck, Secondary Dept. of Education, University of Akron, OH 44325*

**Student-Science Related Attitudes, Self-Evaluation of Abilities to Do Science, and Perception of Past Experience Following a Two Year School Science Requirement**

*Orrin Gould*

*Khalil Y. Khalili*

*393 Education Bldg., University of Illinois, 1310 South Sixth Street, Champaign, IL 61820*

---

11:30 a.m. - 12:30 p.m.

SESSION B-3

Iberville Room

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**PAPERS: TEACHER CHARACTERISTICS AND STUDENT PERFORMANCE**

Presider

*Michael J. Padilla, University of Georgia*

Contributed Papers

Teacher Responsibility for Student Success and Failure and Observed Teaching Characteristics Among Secondary Science and Mathematics Teachers

*Donald L. Pratt, 212 McWhinnie Hall, University of Wyoming, Laramie, WY 82071*

Teacher Instruction and Student Performance in Balancing Chemical Equations

*William L. Yaroch, Division of education and Public Services, Houghton, MI 49931*

Teacher Behavior and Student Cognitive Learning in Fifteen BSCS Green Version Biology Classes

*Darrel Mullinix, Wayne Memorial High School, Westland, MI*

*Burton E. Voss, School of Education, University of Michigan, Ann Arbor, MI 48109*

**PAPERS: EFFECTS OF INTELLECTUAL DEVELOPMENT**

Presider

*Patricia A. Isaacs*

Contributed Papers

**The Effects of Using Concrete Analogies on Formal and Nonformal Operational Nursing Students' Understanding Physiological and Pathophysiological Abstractions**

*Don Johnson, 7627 Lynn Ann, San Antonio, TX 78240*

*James Barifauldi, University of Texas at Austin, Austin, TX*

**Effects of Traditional and Discovery Instructional Approaches on Learning Outcomes for Learners of Different Intellectual Development: A Study of Chemistry Students in Zambia**

*H. Seymour Fowler, 164 Chambers Bldg., The Pennsylvania State University, University Park, PA 16802*

*Moses M. Mulopo, Dept. of Education, University of Zambia*

**The Relationship Between Piagetian Cognitive Developmental Levels as Measured by the Burney Logical Reasoning Test and Selected Scholastic Variables of Prospective Korean Secondary School Teachers**

*Dr. Yong-Kyoo Song, Chungnam National University, College of Natural Sciences, Dept. of Biology, 220 Gung-dong, Chung-gu, Daejeon 300-31, Korea*

*H. Seymour Fowler, Pennsylvania State University, 164 Chambers Bldg., University Park, PA 16802*

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11:30 a.m. - 12:30 p.m.

SESSION B-5

Bonnet Carre Room

---

**PAPERS: GENERAL INTEREST**

Presider

*David L. Haury, Judson Baptist College*

Contributed Papers

**Delineating Classroom Variables Related to Students' Conceptions of the Nature of Science**

*Norman G. Lederman, Dept. of Science Teaching, 101 Heroy, Syracuse University, Syracuse, NY 13210*

**Some Modest Claims for the Virtue of Science as a Context Within Which the Development of Adolescents May Be Changed:  
An Exploratory Study**

*Michael Shayer, Chelsea College, Bridges Place, London SW6, England*

*Hugh Wylam, Beacon School, Crowborough, Sussex, England*

**Comparing Visual-Spatial Learning in Adult Men and Women**

*Thomas R. Lord, Burlington County College, Pemberton-Brown Mills Road, Pemberton, NJ 08068*

## SATURDAY, APRIL 28

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12:40 p.m. - 1:50 p.m.

LUNCH

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2:00 p.m. - 3:00 p.m.

SESSION C-1

Queen Anne Room

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### **SYMPOSIUM: A RESEARCH AND DEVELOPMENT AGENDA FOR COMPUTING IN SCIENCE**

#### Presider

*Fred N. Finley, University of Maryland*

#### Papers

Research Using Microcomputers in Gathering, Displaying, and Analyzing Laboratory Data

*Carl F. Berger, 1110 Education Bldg., University of Michigan, Ann Arbor, MI 48104*

Computer Related Research and Development in Teacher Education

*James R. Okey, Dept. of Science Education, 212 Aderhold Hall, University of Georgia, Athens, GA 30602*

Interactive Computer Graphics and the Transition from Concrete Manipulation of Objects to Abstract Thinking

*Arthur L. White, Science and Mathematics Education, Ohio State University, Columbus, OH 43210*

#### Discussant

*Robert D. Sherwood, Vanderbilt University*

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2:00 p.m. - 3:00 p.m.

SESSION C-2

Bienville Room

---

**PAPERS: SCIENCE CONCEPT LEARNING**

Presider

*John R. Mergendoller, Far West Laboratory*

Contributed Papers

Twelve-Year Longitudinal Case Studies of Science Concept Learning

*Joseph D. Novak, 103 Stone Hall, Dept. of Education, Cornell University, Ithaca, NY 14853*

Forgetting versus Savings: The Many Facets of Long-Term Retention

*Hanna J. Arzi*

*Ruth Ben-Zvi*

*Uri Ganiel*

*Dept. of Science Teaching, Weizmann Institute of Science, Rehovot 76100, Israel*

The Effect of Prescribed Instruction on the Mastery of Science Concepts by Nonformal Students

*Steve Fields, 3754 Stanford Circle, Decatur, GA 30034*

*Ron Good, Florida State University, Education Bldg., Rm. 209, Tallahassee, FL 32306*

**SATURDAY, APRIL 28**

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**2:00 p.m. - 4:15 p.m.**

**SESSION C-3, D-3**

**Iberville Room**

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**RESEARCH METHODS SEMINAR/WORKSHOP: ANALYZING SCIENCE TEXTBOOK PROSE: A WORKSHOP  
IN PRACTICAL METHODS FROM COMPREHENSIVE RESEARCH**

Presider

*Robert H. Evans, Wake Forest University*

Presenter

*Sarah L. Ulerick, Dept. of Geological Sciences, University of Oregon, Eugene, OR 97403*

**SATURDAY, APRIL 28**

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2:00 p.m - 3:00 p.m.

SESSION C-4

Cabildo Room

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**INVITED SYMPOSIUM: SCIENCE EDUCATION RESEARCH IN GERMANY**

Presider

*Graham Orpwood, Science Council of Canada*

Participants

*Karl Frey*

*Peter Haussler*

*Lore Hoffman*

*Lurgen Rost*

*Institute for Science Education, Olshausenstr. 40-60, D-2300 Kiel, Fed. Rep. Germany*

*Hans Spada, University, Institute for Psychology, D-Freiburg, Fed. Rep. Germany*

**SATURDAY, APRIL 28**

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2:00 p.m. - 3:00 p.m.

SESSION C-5

Bonnet Carre Room

---

**PAPERS: LEARNING**

Presider

*O. Roger Anderson, Columbia University*

Patterns of Hierarchy in Formal and Principled Moral Reasoning

*Dr. Dana L. Zeidler, Delaware State College, Lib. LSC, Dover, DE 19901*

Problems in Administering Piagetian Tasks to Adult Samples

*Bill Congero*

*Sandra Pellens-Meinhard*

*285 Med. Labs, University of Iowa, Iowa City, IA 52242*

Student Opinions of the Laboratory Activities in the Learning Cycle in Secondary School Physics

*John W. Renner*

*Michael R. Abraham*

*University of Oklahoma, Norman, OK 73019*

*Howard H. Birnie, University of Saskatchewan, Saskatoon, Saskatchewan, Canada*

**SATURDAY, APRIL 28**

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**3:15 p.m. - 4:15 p.m.**

**SESSION D-1**

**Queen Anne Room**

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**SYMPOSIUM: ANALYZING HIERARCHICAL RELATIONSHIPS AMONG MODES OF COGNITIVE REASONING AND INTEGRATED  
PROCESS SKILLS**

Presider

*Darrell Mullinix, University of Michigan*

Participants

*Russell H. Yeany*

*Michael J. Padilla*

*Dept. of Science Education, University of Georgia, Athens, GA 30602*

*Kueh Chin Yap, Science Education Research and Evaluation Lab, University of Georgia, 215 Fain Hall, Athens, GA 30602*

Discussant

*Michael Shayer, Chelsea College*

**PAPERS: FACTORS INFLUENCING ACHIEVEMENT**

Presider

*Julia V. Clark, Howard University*

Contributed Papers

**The Relationship Between Cognitive Development of High School Students and Their Achievement in Chemistry**

*Joseph S. Krajcik, 1102 Hollywood Blvd., Apt. 1, Iowa City, IA 52240*

*Richard E. Haney, Dept. of Curriculum & Instruction, University of Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, WI 53201*

**A Study of the Effects of Cooperative Biological Research Experiences on High School Biology Students, Teachers, and University Scientists**

*Kathleen A. O'Sullivan*

*Earl J. Montague*

*Science Education Center, EDB 340, University of Texas at Austin, Austin, TX 78712*

**How Does Science and Mathematics Correlation in a Seventh Grade Physics Unit Affect Selected Seventh Grade Students' Attitudes Toward and Achievement in Science?**

*Harold Friend, 143-30 Roosevelt Avenue, Flushing, NY 11354*

*Mitchell Wisotsky, 46 Fairfield Drive, Dix Hills, NY 11746*

*Jack Segal, 18 Fairfield Drive, Dix Hills, NY 11746*

*Rita Petosa, 22-15 49 Street, Long Island City, NY 11105*

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**3:15 p.m. - 4:15 p.m.**

**SESSION D-4**

**Cabildo Room**

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**PAPERS: TEST DEVELOPMENT**

Presider

*Donald L. Pratt, University of Wyoming*

Contributed Papers

**Development of a Computer Animated Science Process Skills Test**

*Michael E. Hale*

*Edward L. Shaw*

*James R. Okey*

*Joseph C. Burns*

*Dept. of Science Education, University of Georgia, Athens, GA*

**Development of a Test of Process Skills for Grade 3 Elementary School Pupils**

*Patricia A. Isaacs, School of Education, University of the West Indies, Mona, Kingston 7, Jamaica, W.I.*

**Construction and Validation of a Pictorial Physics Test and Analyses of Its Relationship to Intellectual Development and Science Aptitude for Junior High School Students in Taiwan**

*Rong-Fu Hsu, College of Science, National Taiwan Normal University, Taipei, Taiwan, Republic of China*

*H. Seymour Fowler, Pennsylvania State University, 164 Chambers Bldg., University Park, PA 16802*

## SATURDAY, APRIL 28

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3:15 p.m. - 4:15 p.m.

SESSION D-5

Bonnet Carre Room

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### PAPERS: SCIENCE TEACHING

#### Presider

*Michael L. Waugh, Georgia Southern College*

#### Contributed Papers

**The Influence of Field Experiences on Stages of Concern and Attitudes of Preservice Teachers Toward Science and Science Teaching**

*Barbara M. Strawitz*

*Mark R. Malone*

*Dept. of Curriculum & Instruction, Louisiana State University, Baton Rouge, LA 70803*

**Results of Project MAFEX: How Effective are Field Experiences in Science Teacher Education?**

*Mark R. Malone, Louisiana State University*

**The Contribution of Science Locus of Control Orientation to Expressions of Attitude Toward Science Teaching**

*David L. Haury, 400 East Scenic Drive, The Dalles, OR 97058*

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**4:30 p.m. - 5:30 p.m.**

**POSTER SESSION**

**Queen Anne Room**

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**Effects of Manipulating Role-Specific Self-Concept**

*Stephen L. Judd, 6800 Elliot Ct., The Colony, TX 75056*

*Wm. J. Kermis, Ph.D., University of Texas at Dallas, P.O. Box 688/FN-32, Richardson, TX 75080*

**An Investigation of Secondary School Principals' Individual Administrative Styles and Their Influence on the Levels of Effectiveness of Science Research Skills Programs for Gifted and Talented Students**

*Jeanne R. Pizzo, 1613 Falmouth Avenue, New Hyde Park, NY 11040*

*Arlene M. Asti, 37 Polo Lane, Westbury, NY*

*Peter K. Lynch, 1509 Grand Avenue, Baldwin, NY*

**The Effect of Piagetian Teacher Re-Training on Attitude and Achievement on Science Related Classification Tasks, and Vocabulary Skills of Concrete Operational Children**

*Antoinette Mansfield, J.F. Kennedy High School, 300 Bellmore Avenue, Bellmore, NY 11710*

*James Reed Campbell*

*John Swanchak*

*St. John's University, 2 Rellin Drive, Glen Cove, NY 11542*

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4:30 p.m. - 5:30 p.m.

POSTER SESSION CONTINUED

Queen Anne Room

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A Comparison of Organizational Identification and Departmental Cohesiveness Between Selected High School Science Teachers and Selected College Teachers of Science

*Carole Rutland, 1651 18th Avenue, Columbus, GA*

*Mildred W. Graham, Georgia State University, Atlanta, GA 30303*

A Study of the Status of the Affective and Cognitive Dimensions of Computer Literacy Among Students According to Educational Level and Sex

*Kathleen J. Williams, P.O. Box 632, Snellville, GA 32078*

*Mildred W. Graham, Georgia State University, Atlanta, GA 30303*

**SATURDAY, APRIL 28**

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**5:30 p.m. - 6:30 p.m.**

**SOCIAL HOUR (CASH BAR)**

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**SATURDAY, APRIL 28**

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**9:00 p.m. - 10:00 p.m.**

**NEW MEMBERS RECEPTION WITH  
PRESIDENT ANN HOWE, NARST BOARD**

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**SUNDAY, APRIL 29**

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**8:30 a.m. - 10:00 a.m.**

**SESSION E-1**

**Queen Anne Room**

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**PAPER SET: LEARNING SCIENCE IN OUT-OF-SCHOOL SETTINGS**

Presider

*John J. Koran, Jr., University of Florida*

Papers

**Age, Sex and Time on Task in Manipulative Museum Settings**

*S.J. Longino*

*John J. Koran, Jr.*

*College of Education, University of Florida, Gainesville, FL 32611*

**The Effects of Learning of Science Exhibits with Accompanying Questions**

*K. Lehman*

*Jeffrey R. Lehman*

*State University of New York, Albany, NY 12222*

Studying Recessing as an Attention-Directing Devise in a Museum Exhibit

*L.D. Dierking*

*John J. Koran, Jr.*

*Mary Lou Koran*

*College of Education, University of Florida, Gainesville, FL 32611*

Visitor Behavior as a Function of Time in Museum

*J.H. Falk (with Smithsonian Institute)*

*J.J. Koran, Jr.*

*L.D. Dierking*

*L. Dreblow (with Smithsonian Institute)*

*College of Education, University of Florida, Gainesville, FL 32611*

Latent Effects of Family Learning Courses in Science

*Karen Ostlund*

*Eugene Gennaro*

*Nancy Henreid*

*College of Education, Peik Hall, University of Minnesota, Minneapolis, MN 55455*

Discussant

*Mary Lou Koran, University of Florida*

## NARST PROGRAM PLANNING GUIDE

<b>FRIDAY APRIL 27</b>	<b>1:00 - 5:00 p.m.</b>	<b>Meeting of the Board of Directors</b>
	<b>8:45 - 10:00 p.m.</b>	<b>Registration and Information</b>
	<b>8:30 - 10:00 p.m.</b>	<b>Social Hour (cash bar)</b>

## PLANNING GUIDE — continued

<b>SATURDAY APRIL 28</b>	8:00 - 5:30 p.m.	<b>Registration and Information</b>				
	8:30 - 10:00 a.m.	A-1	A-2	A-3	A-4	A-5
	10:15 - 11:15 a.m.	<b>General Session I</b>				
	11:30 - 12:30 p.m.	B-1	B-2	B-3	B-4	B-5
	12:40 - 1:50 p.m.	<b>Lunch</b>				
	2:00 - 3:00 p.m.	C-1	C-2	C-3	C-4	C-5
	3:15 - 4:15 p.m.	D-1	D-2	D-3	D-4	D-5
	4:30 - 5:30 p.m.	<b>Poster Session</b>				
	5:30 - 6:30 p.m.	<b>Social Hour (cash bar)</b>				
	9:00 - 10:00 p.m.	<b>New Members Reception</b>				

**SUNDAY  
APRIL 29**

<b>8:00 - 5:30 p.m.</b>	<b>Registration and Information</b>				
<b>8:30 - 10:00 a.m.</b>	<b>E-1</b>	<b>E-2</b>	<b>E-3</b>	<b>E-4</b>	<b>E-5</b>
<b>10:15 - 11:15 a.m.</b>	<b>F-1</b>	<b>F-2</b>	<b>F-3</b>	<b>F-4</b>	<b>F-5</b>
<b>11:30 - 1:15 p.m.</b>	<b>Awards Luncheon</b>				
<b>1:30 - 2:30 p.</b>	<b>G-1</b>	<b>G-2</b>	<b>G-3</b>	<b>G-4</b>	<b>G-5</b>
<b>2:45 - 3:45 p.m.</b>	<b>H-1</b>	<b>H-2</b>	<b>H-3</b>	<b>H-4</b>	<b>H-5</b>
<b>4:00 - 5:30 p.m.</b>	<b>General Session II</b>				
<b>5:30 - 6:30 p.m.</b>	<b>Social Hour (cash bar)</b>				

## PLANNING GUIDE — continued

<b>MONDAY APRIL 30</b>	8:30 -	<b>Registration and Information</b>				
	8:30 - 9:30 a.m.	I-1	I-2	I-3	I-4	I-5
	9:30 - 10:00 a.m.	<b>Business Meeting</b>				
	10:15 - 11:15 a.m.	J-1	J-2	J-3	J-4	J-5
	11:30 - 12:30 p.m.	K-1	K-2	K-3	K-4	K-5

**PAPERS: CHANGING AND ASSESSING TEACHER ATTITUDES**

Presider

*Dana L. Zeidler, Delaware State College*

Papers

Self-Generated Thought as a Result of a Persuasive Message and Its Implications on the Attitudes Toward Energy Conservation of Pre-service Elementary Teachers

*Thomas R. Koballa, Jr., Science Education Center, The University of Texas at Austin, Austin, TX 78712*

The Procedure for Revising a Likert Scale Assessing Pre-service Teachers' Attitudes Towards Teaching Science

*Cathy L. Thompson*

*Robert L. Shrigley*

*Pennsylvania State University, University Park, PA 16802*

The Effect of Participation in an Activity Oriented Science Curriculum Development Workshop on the Attitude of Elementary Teachers in Trinidad and Tobago

*P. Fraser Abder, School of Education, University of the West Indies, St. Augustine, Trinidad, West Indies*

Impact Study of Energy Education Workshops on the Participants and Their Peer Teachers

*Betty L. Bitner, Arkansas Tech. University, Russellville, AR 72801*

*Lloyd H. Barrow, University of Maine at Orono, Orono, ME 04469*

*Constance C. Holden, Bangor Community College, University of Maine, Bangor, ME 04401*

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**8:30 a.m. - 10:00 a.m.**

**SESSION E-3**

**Iberville Room**

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**RESEARCH METHODS SEMINAR: LEVELS OF USE: A STRATEGY FOR ASSESSING IMPLEMENTATION**

Presider

*Norman G. Lederman, Syracuse University*

Presenter

*Robert James, Kansas State University*

**SUNDAY, APRIL 29**

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**8:30 a.m. - 10:00 a.m.**

**SESSION E-4**

**Cabildo Room**

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**PAPERS: RESEARCH METHODS**

Presider

*Ronald D. Anderson, University of Colorado*

Contributed Paper

Triangulation Approach to Research on Science Learning in the School Laboratory

*Yael Friedler*

*Pinchas Tamir*

*Israel Science Teaching Center, Hebrew University, Jerusalem 91904, Israel*

Using Interactive Logo Procedures to Enhance Clinical Interviews with Children

*Larry Flick, 6260 North Delaware, Indianapolis, IN 46220*

A Semantics for Interview Transformation

*Charles R. Ault, Curriculum and Instruction Dept., School of Education, Indiana University, Bloomington, IN 47405*

Electro-Mechanical Measurements of Physiological Out-Put in Response to Test Stimuli

*William J. Kermis, The University of Texas at Dallas, Richardson, TX 75080*

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8:30 a.m. - 10:00 a.m.

SESSION E-5

Bonnet Carre Room

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**PAPER SET: RESEARCH AND DELIBERATION FOR SCIENCE EDUCATION RENEWAL: THE CANADIAN EXPERIENCE**

Presider

*Barbara M. Strawitz, Louisiana State University*

Papers

Deliberative Inquiry: A Model for Science Education Review

*Graham W.F. Orpwood, 100 Metcalfe Street, Ottawa, Ontario, Canada K1P 5M1*

Analyzing Science Textbooks to Find "Textbook Science"

*Jean-Pascal Souque, 100 Metcalfe Street, Ottawa, Ontario, Canada K1P 5M1*

Who Speaks for What and Why? Analyzing Policy Debate in Science Education

*Douglas A. Roberts, Dept. of Curriculum & Instruction, Faculty of Education, University of Calgary, Calgary, Alberta, Canada T2N 1N4*

**SUNDAY, APRIL 29**

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10:15 a.m. - 11:15 a.m.

SESSION F-1

Queen Anne Room

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**PAPERS: LEARNING IN CHEMISTRY**

Presider

*William L. Yarroch, Michigan Technological University*

Contributing Papers

The Effects of Reasoning, Use of Models, and Sex on Post-test Achievement in Chemical Bonding after Constant Instruction

*John R. Staver, College of Education, University of Illinois at Chicago, Chicago, IL 60680*

*Douglas A. Halsted, Evanston Township High School, Evanston, IL*

Interaction of Learner Characteristics with Learning from Three Forms of the Periodic Table and Written Text

*Jeffrey R. Lehman, Dept. of Teacher Education, 1400 Washington Avenue, Albany, NY 12222*

*John J. Koran, Jr.*

*Mary Lou Koran*

*University of Florida, 343 Norman Hall, Gainesville, FL 32611*

The Actual and Preferred Classroom Learning Environment of Israeli Chemistry Students

*Avi Hofstein, Science Teaching Dept., Weizmann Institute of Science, Rehovot 76100, Israel*

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**10:15 a.m. - 11:15 a.m.**

**SESSION F-2**

**Bienville Room**

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**PAPERS: SCIENCE TEACHING IN HIGHER EDUCATION**

Presider

*Margaret J. Walkosz, University of Georgia*

Contributed Papers

An Experimental Test of an Extended Discretion Laboratory Approach for University General Biology

*William H. Leonard, School of Life Sciences, College of Education, Louisiana State University, Baton Rouge, LA 70803*

A Study of Field Independent Biased Mental Ability Tests in Community College Science Classes

*Linda W. Crow, 22 Waugh Drive, Houston, TX 77007*

*Martha K. Piper, University of Houston, Victoria Campus, 2302-C Red River, Victoria, TX 77901*

Characteristics Associated with Acceptance into a 2-year Nursing Program

*Carol Biermann, Kindgborough Community College, Dept. of Biological Sciences, Oriental Blvd., Manhattan Beach, Brooklyn, NY 11235*

**SUNDAY, APRIL 29**

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**10:15 a.m. - 11:15 a.m.**

**SESSION F-3**

**Iberville**

---

**PAPERS: MICROCOMPUTERS IN THE CLASSROOM**

Presider

*John Novak, Ohio State University*

Contributed Papers

Assessing the Implementation of Microcomputers

*Robert K. James, Curriculum and Instruction, College of Education, Kansas State University, Manhattan, KS 66506*

*Irwin Noyes, Dodge City Community College, Dodge City, KS*

The Effects of Two Modes of Microcomputer Instruction on the Knowledge and Attitudes of Science Education Students

*Amnuay Narthasilpa*

*Robert L. Shrigley*

*168 Chambers Bldg., Pennsylvania State University, University Park, PA 16802*

The Impact of Microcomputer Simulations on the Achievement and Attitude of High School Physical Science Students

*Keven C. Wise, Science Education, 933 Shimkin Hall, New York University, New York, NY 10012*

*James R. Okey, Science Education, 212 Aderhold Hall, University of Georgia, Athens, GA 30602 .*

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**10:15 a.m. - 11:15 a.m.**

**SESSION F-4**

**Cabildo Room**

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**SUMMARY OF RESEARCH IN SCIENCE EDUCATION - 1982**

Presider

*Victor J. Mayor, Ohio State University*

Presenters

*Roger G. Olstad*

*David L. Haury*

*Curriculum and Instruction, College of Education, University of Washington, Seattle, WA 98195*

**SUNDAY, APRIL 29**

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**10:15 a.m. - 11:15 a.m.**

**SESSION F-5**

**Bonnet Carre Room**

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**SYMPOSIUM: REFINING THE SEX AGENDA IN SCIENCE EDUCATION FOR THE EIGHTIES**

Presider

*Ellen Osbourne Goggins, Akron Public Schools*

Participants

*Elizabeth K. Stage*

*Marcia C. Linn*

*Lawrence Hall of Science, University of California, Berkely, CA 94720*

*Jane Bowyer, Mills College, Oakland, CA 94613*

Discussant

*Jane Butler Kahle, Purdue University*

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**11:30 a.m. - 1:15 p.m.**

**AWARDS BANQUET**

**La Nouvelle Orleans Room**

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**1:30 p.m. - 2:30 p.m.**

**SESSION G-1**

**Queen Ann Room**

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**PAPERS: SCIENCE CURRICULUM DEVELOPMENT**

Presider

*Robert Howe, Ohio State University*

Contributed Papers

*A Meta-Evaluation of the Formative Evaluation Activities of a Science Curriculum Project*

*Barry J. Fraser, Western Australian Institute of Technology, Hayman Road, South Bentley, WA 6102 Australia*

*Science Education and Philosophy of Science: Twenty-five Years of Mutually Exclusive Development*

*Richard Duschl, Curriculum and Instruction, University of Houston - University Park, Houston, Texas 77004*

*Teacher and Student Role in the Implementation of a New Inquiry Based Science Curriculum*

*Margaret S. Gremler, Regional Institute of Higher Education and Development, 15 Grange Road, Singapore 0923, Republic of Singapore*

**SUNDAY, APRIL 29**

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**1:30 p.m. - 2:30 p.m.**

**SESSION G-2**

**Blenville Room**

---

**PAPERS: COGNITIVE TEACHER BEHAVIOR**

Presider

*Herbert G. Cohen, Arizona State University*

Contributed Papers

**The Effects of a Written Protocol Model on Teacher Acquisition of Extended Wait-Time**

*Linda R. DeTure, School of Education and Human Development, Rollins College, Winter Park, FL 32789*

*Ann Miller, 1277 Muirforest Drive, Stone Mountain, GA 30088*

**Observed Changes in Classroom Behavior Utilizing Supportive Intervention**

*J. Nathan Swift*

*Patricia R. Swift*

*C. Thomas Gooding*

*State University of New York, Oswego, NY 13126*

**The Relationship of Role Models and Young Women's Choices of Careers in Science-Related Fields**

*Rena Faye Smith, 3057 Dove Way, Decatur, GA 30033*

*Edward C. Lucy, University Plaza, Georgia State University, Atlanta, GA 30303*

**SUNDAY, APRIL 29**

---

1:30 p.m - 3:45 p.m.

SESSION G-3, H-3

Iberville Room

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**RESEARCH METHODS SEMINAR/WORKSHOP: USING GENERALIZABILITY THEORY TO EXAMINE AND IMPROVE SCIENCE TESTS**

Presider

*John R. Staver, University of Illinois at Chicago*

Presenter

*Victor L. Willson, Texas A & M University*

**SUNDAY, APRIL 29**

---

1:30 p.m. - 2:30 p.m.

SESSION G-4

Cabildo Room

---

**OUTSTANDING PAPER OF 1983 NARST ANNUAL MEETING**

Presider

*William G. Holliday, University of Calgary*

Presentation and Discussion

(To be announced)

**SUNDAY, APRIL 29**

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1:30 p.m. - 2:30 p.m.

SESSION G-5

Bonnet Carre Room

---

**PAPER SET: APPLYING TEACHER EFFECTIVENESS FINDINGS TO PRE-SERVICE AND IN-SERVICE TEACHER EDUCATION**

Presider

*Betty L. Bitner, Arkansas Technological University*

Papers

Quantitative Measures of Academic Learning Time and Active Teaching Behaviors in Science Classrooms

*Jane Bowyer, Dept. of Education, Mills College, Oakland, CA 94513*

Qualitative Analysis of Cooperating Teaching/Student Teacher Conferencing Interaction

*Thomas L. Russell, Queen's University at Kingston, Ontario, Canada*

Case Studies of Individual Applications of Active Teaching Behaviors to Science Instruction

*Richard Ponzio, Dept. of Education, Mills College, Oakland, CA 94513*

Discussant

*David R. Stronck, University of Victoria*

**SUNDAY, APRIL 29**

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**2:45 p.m. - 3:45 p.m.**

**SESSION H-1**

**Queen Anne Room**

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**SYMPOSIUM: MULTIPLE APPROACHES TO CORRECTING STUDENTS' NAIVE CONCEPTIONS**

Presider

*Hanna J. Arzi, Weizmann Institute of Science*

Participants

*Joan I. Heller*

*Marcia C. Linn*

*University of California, Berkeley, CA 94720*

*Bat-Sheva Eylon, The Weizmann Institute of Science, Rehovot 76100, Israel*

Discussant

*Dorothy J. Gosnell-Moses, University of Texas at Austin*

**SUNDAY, APRIL 29**

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**2:45 p.m. - 3:45 p.m.**

**SESSION H-2**

**Bienville Room**

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**PAPERS: IN-SERVICE EDUCATION**

Presider

*Paul Beisenherz, University of New Orleans*

Contributed Papers

Recommendations of the British Columbia Science Assessment for In-service Education

*David R. Stronck, Faculty of Education, University of Victoria, P.O. Box 1700, Victoria, B.C. V8W 2Y2 Canada*

Elementary Science Education Library Resources in Graduate and Undergraduate Teacher Education Programs of New England

*Lloyd H. Barrow, University of Maine, Shibles Hall, Orono, ME 04469*

Ascertaining the "Desired State" for a Master's Degree Program in Science Education

*Barbara S. Spector, FIU School of Education, Bay Vista Campus ACI-371A, North Miami, FL 33181*

**SUNDAY, APRIL 29**

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**2:45 p.m. - 3:45 p.m.**

**SESSION H-4**

**Cabildo Room**

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**PAPERS: SCIENCE PROCESS SKILLS**

Presider

*Barry J. Fraser, Western Australian Institute of Technology*

Contributed Papers

**Effects of Lab Instruction Emphasizing Process Skills on Achievement of College Students Having Different Cognitive Development Levels**

*Margaret J. Walkosz, Dept. of Biology, Biological Science Bldg., University of Georgia, Athens, GA 30602*

*Russell H. Yeany, Dept. of Science Education, University of Georgia, Athens, GA 30602*

**Factors Related to Pre-service Elementary School Teacher's Science Process Skills**

*Richard N. DeVore, 18-P, Educational Testing Service, Princeton, NJ 08541*

**Relationships Between a Science Program's Different Implementations and Students' Acquisition of Science Processes**

*G. Earle Francq, 2924 James Avenue, Manhattan, KS 66502*

**SUNDAY, APRIL 29**

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2:45 p.m. - 3:45 p.m.

**SESSION H-5**

**Bonnet Carre Room**

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**PAPERS: COGNITIVE DEVELOPMENT AND SCIENCE ACHIEVEMENT**

Presider

*Linda W. Crow, Houston Community College*

Contributed Papers

*The Effects of Cognitive Development and Degree of Structure on Elementary Students' Science Achievement*

*Larry Dean Yore, University of Victoria, Faculty of Education, Box 1700, Victoria, B.C. V8W 2Y2*

*Monitoring the Performance of Groups of Formal and Concrete Cognitive Tendency Students Using an Intensive Time-Series*

*John S. Monk, Dept. of Family Medicine, Ill4 University Hospital Clinic, 456 Clinic Drive, Columbus, OH 43210*

*Victor J. Mayer, Division of Ed. Theory and Practice, The Ohio State University, Columbus, OH*

*Peter Pezaro, Kibbutz Yareel, Israel*

*The Effect of Concrete and Formal Instruction Upon the Reasoning Ability of Sixth Grade Students*

*Walter Saunders, Dept. of Secondary Education, UMC 28, Utah State University, Logan, UT 84322*

*Daniel Shepardson, Dept. of Secondary Education, UMC 28, Utah State University, Logan, UT 84322*

**SUNDAY, APRIL 29**

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**4:00 p.m. - 5:30 p.m.**

**GENERAL SESSION II**

**Queen Anne Room**

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Presider

*Ertle Thompson, University of Virginia*

Symposium

**Research Implications for Allocation of Resources in Science Education: Goals, Priorities and Policies of Funding Agencies**

**Instruction/Learning**

*Ann C. Howe, North Carolina State University*

**Curriculum Development**

*John W. Renner, University of Oklahoma*

**Teacher Education**

*Russell H. Yeany, University of Georgia*

**Goals, Priorities and Policies of NSF**

*Alphonse Buccino, Director, Office of Special Activities, Directorate for Science and Engineering Education, National Science Foundation, Washington, D.C. 20550*

Discussant

*Joseph D. Novak, Cornell University*

**SUNDAY, APRIL 29**

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**5:30 p.m. - 6:30 p.m.**

**SOCIAL HOUR (CASH BAR)**

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8:30 a.m. - 9:30 a.m.

SESSION I-1

Queen Anne Room

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**PAPER SET: SECONDARY ANALYSIS RESULTS FROM THE 1981-82 NATIONAL ASSESSMENT IN SCIENCE**

Presider

*Wayne W. Welch, University of Minnesota*

Papers

The Effects of Schooling on Science Achievement

*Linda Harris, 2122 Riverside, MCSR, Inneapolis, MN 55455*

Women in Science: Perceptions of Secondary School Students

*Wayne W. Welch, 210 Burton Hall, 178 Pillsbury Drive, SE, Minneapolis, MN 55455*

Predictors of Science Inquiry Knowledge

*Steven J. Rakow, 210 Burton Hall, 178 Pillsbury Drive, SE, Minneapolis, MN 55455*

Discussant

*Stanley L. Helgeson, Ohio State University*

**MONDAY, APRIL 30**

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**8:30 a.m. - 9:30 a.m.**

**SESSION I-2**

**Bienville Room**

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**PAPERS: SPATIAL LEARNING AND GENERAL INTEREST**

Presider

*Avi Hofstein, Weizmann Institute of Science*

Contributed Papers

Spatial Conceptual Abilities of Navajo Students

*Herbert G. Cohen, College of Education, Payne B204, Arizona State University, Tempe, AZ 85287*

Effects of Laboratory Activities and Written Simulations on the Acquisition of Graphing Skills by Eighth Grade Students

*Danny L. McKenzie, Biology Dept., Southwest Texas State University, San Marcos, TX 78666*

*Michael J. Padilla, Dept. of Science Education, University of Georgia, Athens, GA 30602*

A Survey of Accidents in the Secondary School Science Laboratory

*Joseph G. Krajovich, 100 Municipal Blvd., Edison, NJ 08817*

**MONDAY, APRIL 30**

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**8:30 a.m. - 9:30 a.m.**

**SESSION I-3**

**Iberville Room**

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President

*John W. Renner, University of Oklahoma*

Contributed Papers

Analysis of Errors Made by Students Solving Genetics Problems

*Sandra Judith Costello, 180 Franklin Corner Road, D12, Lawrenceville, NJ 08648*

A Proposed Developmental Sequence for Problem-Solving Ability in Classical Genetics: The Trial-and-Error to Deductive Logic Continuum

*Mike U. Smith, Biology Dept., 309 New Science Bldg., Southeast Missouri State University, Cape Girardeau, MO 63701*

*Ron Good, Dept. of Curriculum and Instruction, Florida State University, Tallahassee, FL 32301*

Problem Solving Patterns in Introductory Physics

*George J. Pallrand*

*Walter Lockwood*

*David Van Harlingen*

*Rutgers University, New Brunswick, NJ 08903*

**MONDAY, APRIL 30**

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8:30 a.m. - 9:30 a.m.

SESSION I-4

Cabildo Room

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**PAPERS: SCIENCE CURRICULUM**

Presider

*Edmund A. Marek, University of Oklahoma*

Contributed Papers

Curricular Goals for Science Education

*Judith Enz Clauss, University of New Orleans, Dept. of Curriculum and Instruction, Education 342, New Orleans, LA 70148*

A Cooperative University-School Implementation of an Elementary School Science Program: A Ten Year Study

*Paul C. Beisenherz*

*Judith Enz Clauss*

*Dept. of Curriculum and Instruction, University of New Orleans, Education 342, New Orleans, LA 70148*

Physics for the Physicists: A Contextual Study of Curriculum Revision

*P. James Gaskell, Faculty of Education, University of British Columbia, 2125 Main Mall, Vancouver, B.C. V6T 1Z5, Canada*

*Patricia Rowell, Faculty of Education, University of British Columbia, Vancouver, B.C. V6T 1Z5, Canada*

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9:30 a.m. - 10:00 a.m.

**BUSINESS MEETING AND OPPORTUNITY TO  
MEET THE NARST BOARD OF DIRECTORS**

**Queen Anne Room**

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Presider

*Ann Howe, President*

**MONDAY, APRIL 30**

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10:15 a.m. - 11:15 a.m.

SESSION J-1

Queen Anne Room

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**PAPERS: ATTITUDES TOWARD SCIENCE**

Presider

*P. Fraser Abder, University of the West Indies*

Contributed Papers

**Relationships of Attitudes Toward Self, Family, and Classroom Environment with Attitudes Toward Science**

*E. Lynn Talton, 1427 West Paces Ferry Road, NW, Atlanta, GA 30327*

*Ronald D. Simpson, Dept. of Science Education, University of Georgia, Athens, GA 30602*

**Relationship Between Affective Variables and Achievement in Science for Nine Year Olds**

*Richard Faller*

*Edward L. Shaw, Jr.*

*Joseph P. Riley*

*Dept. of Science Education, University of Georgia, Athens, GA 30602*

**Validation, Field Test and Administration of the Image and Science and Scientists Scale in Costa Rica**

*Juan Manuel Esquivel, Research Institute for the Improvement of Costa Rican Education (I.I.M.E.C.), School of Education, 2060 University of Costa Rica, San Jose, Costa Rica*

*Joseph G. Krajovich, Supervisor of Science, Edison Township Public Schools, 100 Municipal Blvd., Edison, NJ08817*

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**10:15 a.m. - 11:15 a.m.**

**SESSION J-2**

**Blenville Room**

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**PAPERS: SCIENCE LEARNING IN THE ELEMENTARY SCHOOL**

Presider

*Thomas R. Koballa, Jr., University of Texas at Austin*

Contributed Papers

**The Formation of Ecological Concepts and Conceptual Systems by Upper Elementary Students**

*Julia H. Cothron, Hanover County School Board, 200 Berkley Street, Ashland, VA 23005*

*Ertle Thompson, Ruffner Hall, University of Virginia, Charlottesville, VA 22903*

**An Experimental Study of the Effect of Science Teaching on Third-Grade Children's Ability to Conceptualize Piagetian Physical Causality in Animism and Dynamism**

*Carol A. Sullivan, 280 Winding Way, Camp Hill, PA 17011*

*Roy W. Allison*

*Donald K. Alexander*

*Duane R. Smith*

*Penn State University, Middletown, PA 17057*

**The Effectiveness of the Planetarium in Teaching Selected Science Concepts in the Middle School**

*Henry D. Dobson, Box 348, R.D. #2, Millville, PA 17846*

*H. Seymour Fowler, Chambers Bldg., Penn State University, University Park, PA 16802*

## MONDAY, APRIL 30

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10:15 a.m. - 12:30 p.m.

SESSION J-3, K-3

Iberville Room

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### **WORKSHOP: USING THE 1981-82 NATIONAL ASSESSMENT DATA TAPES FOR SCIENCE RESEARCH**

#### Presider

*John S. Monk, Ohio State University*

#### Presenters

*Steven J. Rakow, University of Minnesota*

*Wayne W. Welch, University of Minnesota*

*Linda Harris, MCSR, 2122 Riverside, Minneapolis, MN*

## MONDAY, APRIL 30

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10:15 a.m. - 11:15 a.m.

SESSION J-4

Cabildo Room

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### MEET THE JOURNAL OF RESEARCH IN SCIENCE TEACHING EDITORS

*James Shymansky (1981-1984), University of Iowa and Russell Yeany (1985-1989), University of Georgia*

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**11:30 a.m. - 12:30 p.m.**

**SESSION K-1**

**Queen Anne Room**

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**PAPERS: SCIENCE FOR THE GIFTED AND TALENTED STUDENTS**

Presider

*Roger G. Olstad, University of Washington*

Contributed Papers

**Examining the Boundaries of Legitimate Scientific Research: Attitudes of 1983 Westinghouse Science Talent Search Recipients**

*Rena F. Subotnik, 115 Miller Hall, DQ 12, Seattle, WA 98195*

**Gifted Science and Math Students: The Asian Immigrants vs. Indigenous Americans - A Comparison Between the Sexes**

*James Reed Campbell, 4 Arosa Court, Greenlawn, NY 11740*

*Charlene Connolly, St. John's University, 1982 Stratford Drive, Westbury, NY 11590*

*Roslyn Bologh, St. John's University, 10 Perth Avenue, New York, NY 10804*

**Exploring Factors Accounting for Success in High School Science and Math for Gifted Male and Female Caucasians**

*Roslyn Bologh, St. John's University, 10 Perth Avenue, New York, NY 10804*

*James R. Campbell, 4 Arosa Court, Greenlawn, NY 11740*

*Charlene Connolly, St. John's University, 1982 Stratford Drive, Westbury, NY 11590*

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11:30 a.m. - 12:30 p.m.

SESSION K-2

Blenville Room

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**PAPERS: MISUNDERSTANDING OF SCIENCE CONCEPTS**

Presider

*William H. Leonard, Louisiana State University*

Contributed Papers

Understandings and Misunderstandings of Biology Concepts

*Edmund A. Marek, Science Education Center, Physical Sciences Room 323, University of Oklahoma, Norman, OK 73019*

Can the History of Science Help Science Educators Anticipate Students' Misconceptions?

*James H. Wandersee, Dept. of Biology and Science Education, Dr. Martin Luther College, College Heights, New Ulm, MN 56073*

Mode of Attending to Scientific Information by Students Who Study Biology for Matriculation Exams at a Low Level

*Sophia Penso*

*Reuven Lazarowitz*

*Dept. of Education in Science and Technology, Israel Institute of Technology, Haifa 32000, Israel*

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**11:30 a.m. - 12:30 p.m.**

**SESSION K-4**

**Cabildo Room**

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**PAPERS: GENERAL INTEREST**

Presider

*Judith Enz Clauss, University of New Orleans*

Contributed Papers

**Significant Differences: All Science Teachers vs. Teachers in Exemplary Programs**

*Ron Bonnstetter*

*John Penich*

*Robert Yager*

*450 VAN, University of Iowa, Iowa City, IA 52242*

**Creation Versus Evolution: A Study of the Opinions of Georgia Science Teachers**

*Paula G. Eglin, 855 North Georgia Drive, Atlanta, GA 30327*

*Mildred W. Graham, University Plaza, Georgia State University, Atlanta, GA 30303*

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