



Improving science teaching
through research

**62nd Annual Meeting
Holiday Inn Union Square
San Francisco, California
March 30 - April 1, 1989**

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PROGRAM COMMITTEE

Chairman

William G. Holliday
 Science Teaching Center
 University of Maryland
 College Park, MD 20742

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Gerald L. Abegg (1989)
 261 Waltham St.
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 Lexington, MA 02173

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 Salt Lake City, UT 84112

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 University of Maryland
 College Park, MD 20742

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 SUNY, Oswego
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 Provo, UT 84602

Rodger W. Bybee ex officio
 Biological Sciences Curriculum Study
 Colorado College
 Colorado Springs, CO 80903

Glenn Markle ex officio
 College of Education
 University of Cincinnati
 Cincinnati, OH 45221-0002

NARST OFFICERS 1988 - 1989

President

Patricia E. Blosser
ERIC
1200 Chambers Road
The Ohio State University
Columbus, OH 43212

President-elect

William G. Holliday
Science Teaching Center
University of Maryland
College Park, MD 20742

Immediate Past President

Linda R. DeTure
Education/Human Development
Box 2726
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Winter Park, FL 32789

Board Members

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Austin, TX 78712

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Department of Curriculum & Instruction
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Emmett L. Wright (1989)
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LaMoine L. Motz (1989)
National Science Teachers Association
1742 Connecticut Avenue, N.W.
Washington, D.C. 20009

Executive Secretary

Glenn Markle
College of Education
University of Cincinnati
Cincinnati, OH 45221-0002

EMERITUS MEMBERS

EDITOR, JOURNAL OF RESEARCH IN SCIENCE TEACHING

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

EDITOR, NARST NEWS

Thaddeus W. Fowler
University of Cincinnati
Cincinnati, OH 45221-0002

RESEARCH COORDINATOR

Rodger W. Bybee
Biological Sciences Curriculum Study
Colorado College
Colorado Springs, CO 80903

Roy W. Allison
Kenneth A. Anderson
N. Eldred Bingham
Paul Blackwood
Glenn Blough
Gerald Craig
George T. Davis
Gene Deady
Frederic B. Dutton
H. Seymour Fowler
Ralph P. Frazier
Harvey J. Goehring
Paul D. Hurd
Marvin L. Ivey
Herman C. Kranzer
Ralph W. Lefler
George G. Mallinson
Jacqueline V. Mallinson
Bob Lepischak
Lester Mills
Clarence H. Nelson
Jerry J. Nisbet
Kenneth V. Olson

Milton O. Pella
Mary Ellen Quinn
David D. Redfield
John W. Renner
Francis Rio
Ruth Roche
Sidney Rosen
Herman J. Ruoff
Herman Schneider
Duane R. Smith
Richard A. Smith
Robert Stollberg
Frank X. Sutman
Ralph Tyler
Edward Victor
William Walsh
Nathan S. Washton
Feltcher G. Watson
Allen D. Weaver

LIFE MEMBERS

Lois M. Shoemaker
H. Craig Sipe

PRESIDENTS OF NARST

- | | | |
|---------------------------|----------------------------|--------------------------|
| ✓ 1928 W.L. Eikenberry | ✓ 1949 Joe Young West | 1970 Willard J. Jacobson |
| ✓ 1929 W.L. Eikenberry | ✓ 1950 N. Eldred Bingham | 1971 Paul D. Hurd |
| ✓ 1930 W.L. Eikenberry | ✓ 1951 Betty Lockwood | 1972 Frank X. Sutman |
| ✓ 1931 Elliot R. Downing | ✓ 1952 Betty Lockwood | 1973 J. David Lockard |
| ✓ 1932 Elliot R. Downing | ✓ 1953 J. Darrell Barnard | 1974 Wayne W. Welch |
| ✓ 1933 Francis D. Curtis | ✓ 1954 George C. Mallinson | 1975 Robert E. Yager |
| ✓ 1934 Ralph K. Watkins | ✓ 1955 Kenneth E. Anderson | 1976 Ronald D. Anderson |
| ✓ 1935 Archer W. Hurd | ✓ 1956 W.C. VanDeventer | ✓ 1977 O. Roger Anderson |
| ✓ 1936 Gerald S. Craig | ✓ 1957 Waldo W. Blanchet | 1978 Roger G. Olstad |
| ✓ 1937 Walter G. Whitman | ✓ 1958 Nathan S. Washton | 1979 James R. Okey |
| ✓ 1938 Hanor A. Webb | ✓ 1959 Thomas P. Fraser | 1980 John W. Renner |
| ✓ 1939 Ralph Powers | ✓ 1960 Vaden W. Miles | 1981 Stanley L. Helgeson |
| ✓ 1940 Otis W. Caldwell | ✓ 1961 Clarence H. Boeck | 1982 Stanley L. Helgeson |
| ✓ 1941 Harry A. Carpenter | ✓ 1962 Herbert A. Smith | 1983 Carl F. Berger |
| ✓ 1942 G.P. Cahoon | ✓ 1963 Ellsworth S. Obourn | 1984 Ann C. Howe |
| ✓ 1943 Florence G. Billig | ✓ 1964 Cyrus W. Barnes | 1985 Ertle Thompson |
| ✓ 1944 Florence G. Billig | ✓ 1965 Frederic B. Dutton | 1986 David P. Butts |
| ✓ 1945 Florence G. Billig | ✓ 1966 Milton O. Pella | 1987 James P. Barufaldi |
| 1946 C.L. Thiele | ✓ 1967 H. Craig Sipe | 1988 Linda R. DeTure |
| ✓ 1947 Earl R. Glenn | ✓ 1968 John M. Mason | 1989 Patricia E. Blosser |
| ✓ 1948 Ira C. Davis | 1969 Joseph D. Novak | |

LOCAL ARRANGEMENTS COMMITTEE

Kathleen O'Sullivan, San Francisco State University, Chair

Mary LeDonne, Haywood Unified School District

Michael Jay, University of California, Berkeley

Glenn Markle, University of Cincinnati

William Holliday, University of Maryland

David Stronck, California State University - Haywood

Angelo Collins, Stanford University

Elizabeth State, University of California - Berkeley

COORDINATORS OF SPECIAL EVENTS

Information/Registration Desk

Glenn Markle, University of Cincinnati

Thaddeus W. Fowler, University of Cincinnati

Guest Speakers

Lynn Dierking, University of Maryland

New Member Reception

Marianne Betkouski-Barnes, University of North Florida

Exploratorium Event

Michael Jay, University of California-Berkeley

Mary LeDonne, Haywood Unified School District

Technological Consultants

Kathleen O'Sullivan, San Francisco State University

Edward Zielinski, Clarion University

NSTA Seattle Events

Michael Jay, University of California-Berkeley

Mary LeDonne, Haywood Unified School District

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, experimental and evaluative studies. Thus, reports of empirical research, critical reviews and theoretical works 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.

The Association's headquarters is located at the University of Cincinnati, Teacher's College (513-475-2335). Inquiries regarding Association matters should be directed to its Executive Secretary, Dr. Glenn Markle, 401 Teacher's College, University of Cincinnati, OH 45221.

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.

Nearly 200 abstracts of research papers presented at our annual meeting.

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

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).

THURSDAY, MARCH 30, 1989

7:00 A.M. - 4:00 P.M.	Information/Registration Desk, adjacent to Ballroom					
	CABLE	SAVOY	SUTTER 1/2	SUTTER 3	NORTH	SOUTH
8:15 - 9:45 A.M.	Executive Board Meeting	Poster Session on Attitudes	Poster Session on Teacher Characteristics and Concerns	Poster Session on Inservice Teacher Education	Poster Session on Learning and Instruction I	Poster Session on Assessment and Implementation of Projects and Programs
8:15 - 11:45 A.M.	BREAK Coffee and Soft Drinks served in poster presentation rooms					
10:15 - 11:45 A.M.	Executive Board Meeting	Poster Session on Problem Solving	Poster Session on Special Issues	Poster Session on Learners	Poster Session on Learning and Instruction II	Poster Session on Preservice and Inservice Teacher Education
11:45 A.M. - 1:00 P.M.	LUNCH					

THURSDAY, MARCH 30, 1989

	CABLE	SAVOY	SUTTER 1/2	SUTTER 3	NORTH	SOUTH
1:00 - 2:30 P.M.	Symposium on History and Teaching	Round Table Discussions	Symposium on Teacher Assessments	Contributed Papers on Cognition	Round Table Discussions	Round Table Discussions
2:30 - 2:45 P.M.	BREAK					
2:45 - 4:15 P.M.	Symposium on Methods and Multi-Sites	Contributed Papers on Laboratories	Panel on Ethics and Field Research	Symposium on Collaborative Research	Round Table Discussions	Round Table Discussions
4:30 - 5:30 P.M.	<p style="text-align: center;">General Session John D. Bransford, Vanderbilt University <i>"Designing Invitations to Thinking"</i> Ballroom</p>					
9:00 - 11:00 P.M.	New Member Reception—Savoy Room					

FRIDAY, MARCH 31, 1989

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	NARST Committee Meetings	Room
7:15 A.M. - 8:15 A.M.	Financial Advisory Committee	Cable
7:15 A.M. - 8:15 A.M.	Publications Advisory Committee	Sutter 1/2
7:15 A.M. - 8:15 A.M.	Program Committee	Sutter 3

FRIDAY, MARCH 31, 1989

	CABLE	SAVOY	SUTTER 1/2	SUTTER 3	NORTH	SOUTH
8:15 - 9:45 A.M.*	Contributed Papers on Policy, Philosophy and History	Contributed Papers on Gender Differences	Contributed Papers on Curriculum and Evaluation	Research Seminar with John Bransford	Contributed Papers on Conceptual Change	Contributed Papers on Instructional Projects
	CABLE	SAVOY	SUTTER 1/2	SUTTER 3	ROOM 2918	
10:00 - 11:30 A.M.	Contributed Papers on Elementary School	Symposium on Enhancing JRST	Contributed Papers on Learner Characteristics	Contributed Papers on Conceptual Change II	Contributed Papers on Inservice Projects	
12:00 - 2:00 P.M.	Awards Luncheon - Ballroom					
7:45 A.M. - Noon 2:00 - 5:30 P.M.	Information/Registration Desk					

*Members are invited to discuss issues with Patricia Blosser, president of NARST, room 2918.

FRIDAY, MARCH 31, 1989

	CABLE	SAVOY	SUTTER 1/2	SUTTER 3	ROOM 2918	
2:15 - 3:45 P.M.	Symposium on Problem Solving	Contributed Papers on Text Designs	Invited Workshop on Writing Grants	Paper Set on Informal Learning	Time to Talk with... Research Coordinator and JRST Editor	
	CABLE	SAVOY	SUTTER 1/2	SUTTER 3	NORTH	SOUTH
4:00 - 5:30 P.M.	Paper Set on Representation and Problem-solving	Symposium on Information Technology	Invited Tutor on Writing Grants	Symposium on Epistemological Issues	Symposium on Analogies	Contributed Papers on Process Skills
	ROOM 2918					
4:00 - 5:30 P.M.	Contributed Papers on Science Teaching					
5:45 - 7:00 P.M.	DINNER					
8:30 - 10:00 P.M.	Ballroom NETWORKING GROUPS:					

SATURDAY, APRIL 1, 1989

	NARST Committee Meetings	Room
7:15 - 8:15 A.M.	Policy Advisory Committee	Cable
7:15 - 8:15 A.M.	Research Committee	Sutter 1/2
7:15 - 8:15 A.M.	Elections	Sutter 3

SATURDAY, APRIL 1, 1989

7:45 - 11:30 A.M., 2:00 - 4:30 P.M.	Information/Registration Desk					
	CABLE	SUTTER 1/2	SUTTER 3	NORTH	SOUTH	2918
8:15 - 9:45 A.M.	Contributed Papers on Learning	Contributed Papers on Teacher Characteristics I	Contributed Papers on Attitudes I	Contributed Papers on Problem-Solving I	Contributed Papers on Teacher Knowledge	Contributed Papers on Concept Learning
9:45 - 10:00 A.M.	BREAK					
10:00 - 11:30 A.M.	Contributed Papers on Teacher Strategy	Contributed Papers on Teacher Characteristics II	Contributed Papers on Attitudes II	Contributed Papers on Problem-Solving II	Contributed Papers on Instructional Computers	Contributed Papers on Teaching and Learning
11:30 A.M. - 1:00 P.M.	LUNCH and Ad Hoc Committee Meetings*					

*Ad Hoc Committee Meetings during lunch: NARST Awards Committee Distinguished Contributions Award Committee
JRST Award Committee Ad Hoc Committee on International Issues
Ad Hoc Committee on Classroom Liaison

SATURDAY, APRIL 1, 1989

1:00 - 2:00 P.M.	General Session Martin Maehr, University of Michigan "It's Not Only What You Know, But What You <i>Want</i> to Know" Ballroom					
	CABLE	SUTTER 1/2	SUTTER 3	NORTH	SOUTH	2918
2:15 - 3:45 P.M.	Award Papers 1988 JRST 1988 NARST	NARST-Eric Annual Review	NARST Monographs	Symposium on Unified Perspective	Symposium on Microcomputer-Based Learning	Research Seminar with Martin Maehr
4:00 - 4:30 P.M.	General Business Meeting—South					
4:30 - 5:15 P.M.	Reception for Meeting Staff—Cable					
5:15 - 6:00 P.M.	Board Meeting—Cable					

THURSDAY, MARCH 30

7:00 A.M. - 12:30 P.M.

Cable

Executive Board Meeting

(This meeting is open to NARST members and is conducted under the authority of the president, as described in the constitution, by-laws and other documents.)

THURSDAY, MARCH 30

8:15 - 9:45 A.M.

Savoy

POSTER SESSION: Research on Attitudes

Presider:

Robert Kilburn
Boston University

Presenters:

- 1/ Implementing an Effective Elementary Science Program: Process and Effect on Student Attitudes
William C. Kyle, Jr., School Mathematics & Science Center
Ronald J. Bonnstetter, The University of Nebraska
Maria A. Sedotti, The University of Connecticut
Donna Dvarskas, Cheshire Public Schools
- 2 Development and Application of a Semantic Differential Scale to Assess High School Student's Attitude-Intention-Behavior Involvement with Nuclear Energy Issues
Scott F. Tefoe, SUNY at Geneseo
Dennis E. Showers, SUNY at Geneseo

- 3 World View Theory and Science Education Research: Fundamental Epistemological Structure as a Critical Factor in Science Learning and Attitude Development
William W. Cobern, Austin College
- 4 Attitudes Toward a Simulation-Based Chemistry Curriculum for Nursing Students
Yehudit (Judy) Dori, The University of Kansas
- 5 Locus of Control and Science Related Attitudes: A Comparison of High School and College Students
Carol L. Stuessy, University of Oklahoma
Paul Rowland, East Carolina University

THURSDAY, MARCH 30

8:15 - 9:45 A.M.

Sutter 1/2

POSTER SESSION: Research on Teacher Characteristics and Concerns

President:

Michael Jay
University of California, Berkeley

Presenters:

- 6P Analysis of Community College Science Faculty Needs and Continuing Science Education Programs Designed to Address These Needs
Linda W. Crow, Baylor College of Medicine
- 7 An Investigation of the Relationships Among Science Anxiety, Efficacy, Teacher Education Background Variables, and Instructional Strategies
Charlene M. Czerniak, Sylvania, Ohio
- 8 The Nature of Teacher Verbal Explanations in Junior-High Science Classrooms
Zoubeida R. Dagher, The University of Iowa
George W. Cossman, The University of Iowa
- 9 Establishing the Perceived Needs and Status of Secondary Kansas Science Teachers
Larry Enochs, Kansas State University
J. Steve Oliver, Kansas State University
Emmett, Wright, Kansas State University

10f **Teacher Ability to Tolerate Ambiguity: A Necessary Requirement for Incorporating Novel Tasks in Physics Instruction**

David F. Treagust, Curtin University of Technology

Monica Leggett, Curtin University of Technology

Bill Wilkinson, University of Hull

Peter Glasson, St. Norbert College

THURSDAY, MARCH 30

8:15 - 9:45 A.M.

Sutter 3

POSTER SESSION: Research Inservice Teacher Education

Presider:

Paul A. Kirschner

Open University of the Netherlands

Presenters:

- 118 Observations Related to Teacher Concept Formation in an in-Service Setting Emphasizing Question Asking Behavior
Lehman W. Barnes, Florida State University
Marianne Betkouski-Barnes, University of North Florida
- 12 The Beginning Science Teacher: A Case Study of Convictions and Constraints
Nancy Brickhouse, University of Delaware
- 13 A Research-Based Design for Inservice Training in Marine Science for Primary, Middle School and High School
Lundie Spence, UNC Sea Grant College Program

8:15 - 9:45 A.M.

North

POSTER SESSION: Research on Learning and Instruction I

Presider:

Kathleen O'Sullivan
San Francisco State University

Presenters:

- 14 Examination of High School Chemistry Textbooks
Eugene L. Chiappetta, University of Houston
Godrej Sethna, University of Houston
David A. Fillman, Galena Park High School
- 15 A Study of Science Activities Occurring in a "Whole-Language" Classroom
Herbert G. Cohen, Arizona State University
- 16 Technology as a Tool in Eliminating Student Misconceptions: Implications for Science Instruction
Paul Eggen, University of North Florida
Sandra McDonald, St. Johns County School Board
- 17 An Investigation of High School Students' Misconceptions Relating to Atoms and Molecules
Alan K. Griffiths, Memorial University of Newfoundland
Kirk Preston, Memorial University of Newfoundland

- 18 The Development and Testing of an Assessment Instrument to Identify Physical Science Misconceptions of Preservice Elementary Teachers
Tung-Hsing Hsiung, University of Georgia
- 19 Enhancing the Learning Cycle With Prediction and Level Three Interactive Videodisc Lessons in Science
Derrick Lavoie, Wayne State University
- 20 Effects of Encouragement or Discouragement for Using Hands-On Science Activities Upon Teaching Style
Barbara Reed, Norcross High School
Betty Crocker, University of North Texas
Edward Shaw, University of South Alabama
- 21 The Design of a Computer-Based Scientific Problem Solving Test for Secondary Students
Robert Rivers, Purdue University-Calumet
Daniel Luncsford, Encyclopaedia Britannica
- 22 Enhancement of Science Concept Understanding through Videodisk Technology: Implications for Elementary Science Methods Courses
Nancy R. Romance, Florida Atlantic University
Michael R. Vitale, Florida Atlantic University
- 23 An Analysis of the Most Used Science Textbooks in Secondary Schools in the United States
Betty Chiang Soong, The University of Iowa
Robert E. Yager, The University of Iowa
- 24 Implementing Change in Secondary Science Reading and Textbook Usage: A Designed Image, A Current Profile and a Plan for Change
Larry D. Yore, University of Victoria
David Denning, University of Victoria
- 25^P The Effectiveness of Dynamic Models on Conceptual Shifts in College Students
Dana Lewis Zeidler, Delaware State College
William J. McIntosh, Delaware State College

8:15 - 9:45 A.M.

South

POSTER SESSION: Research on Assessment and Implementation of Projects and Programs

Presider:

Joseph S. Krajcik
University of Maryland at College Park

Presenters:

26 STAR Science Teaching Action Research in the Elementary School

Gerald L. Abegg, Boston University

Valerie Franks, Boston University

Patricia Koenig, Boston University

27 Teachers' Perceptions of Barriers in Utilizing SCIS-11

Ronald K. Atwood, University of Kentucky

Michael N. Howard, Fayette County Schools

28 An Evaluation of a Teacher Enhancement Project on Educational Computing

James D. Ellis, Biological Sciences Curriculum Study

27 A Cross-cultural Study of High School Biology Classrooms: Teachers and Student Teachers in Panama and the U.S.

James Gallagher, Michigan State University

Deyanira Barnett, University of Panama

Proposals for Sustaining Students' Interest in Science & Technology in a Non-Western Culture

- 30 Olugbemiro J. Jegede, Curtin University
Peter Okebukola, Lagos State University
- 31 The Promotion of Scientific Literacy Through Informal Science Experiences in a High School Class
André Rossouw, Rand Afrikaans University
- 32 Science Teaching in Florida Elementary Schools: A Preliminary Study
Barbara S. Spector, University of South Florida
Mary Ann Davis, University of South Florida
Meta VanSickle, University of South Florida
- 33 Outcomes of a Cooperative School-College Project Involving Teachers as Researchers
J. Nathan Swift, State University of New York at Oswego
C. Thomas Gooding, State University of New York at Oswego
Patricia R. Swift, State University of New York at Oswego
Robert E. Schell, State University of New York at Oswego
James H. McCroskery, Rhode Island College
- 34 Factors Influencing Implementation of Desired Outcomes of a Science Institute
Karen L. Swift, University of Michigan
- 35 Cooperative Learning and Group Educational Modules: Effects on Cognitive Achievement of High School Biology Students
Scott B. Watson, East Carolina University
- 36 Teaching/Learning Styles, Performance, and Students' Teaching Evaluation in S/T/E/S-Focussed Science Teacher Education, A Quasi-Quantitative Probe of a Case Study
Uri Zoller, Haifa University - Oranim
- 37 Teaching Investigative Skills through Computer Simulation
William R. Zeitler, University of Georgia
Chao-ti Hsiung, Taiwan Provincial Taipei Teachers College

10:15 - 11:45 A.M.

Savoy

POSTER SESSION: Research on Problem-Solving

Presider:

Marianne Betkouski-Barnes
University of North Florida

Presenters:

- 38 Teachers' Problem Solving Strategies: The Case of High School Physics Teachers Committed to Teaching for Conceptual Change
Mariona Espinet, University of Georgia
- 39 Influence of Task Context on Proportional Problem Solving
Anne Misiak, Rutgers University
- 40 Translation of Algebraic Equations and Its Relation to Formal Operational Reasoning
Mansoor Niaz, Purdue University
- 41 Short-term Memory Limitations and Problem Solving
Wolff-Michael Roth, Indiana University
- 42 Neurocognitive Activity of High School Female and Male Students During Problem Solving Tasks in Chemistry
John F. Schaff, The University of Toledo
Marlin Languis, Ohio State University
Donald Russell, Dublin High School
- 43 The Effect of New Vocabulary on Problem Solving in Novice Physics Students
Stanley J. Sobolewski, SUNY at Buffalo

THURSDAY, MARCH 30

10:15 - 11:45 A.M.

Sutter 1/2

POSTER SESSION: Research on Special Issues

President:

Joseph Riley III
University of Georgia

Presenters:

- 448 The Impact of Educational Reform on the Development of Science Objectives
David Blood, Governors State University
- 45 The Construction of School Physics Knowledge: An Ethnographic Study of Three Experienced High School Teachers
Armando Contreras, Universidad de los Andes
- 46 Changes in Secondary Student's Reactions to the Chernobyl Nuclear Accident from 1986-1988
Dennis E. Showers, SUNY at Geneseo
- 47 Using the Past to Predict the Future of Bioeducation: A Content Analysis of *The American Biology Teacher*
James H. Wandersee, Dr. Martin Luther College

10:15 - 11:45 A.M.

Sutter 3

POSTER SESSION: Research on Learners

President:

Mary Nakhleh

University of Maryland at College Park

Presenters:

48 An Empirical Investigation into Factors Affecting Achievement in High-School Physics
Khalil Y. Khalili, Yarmouk University

49 The Influence of Selected Pre-High School and High School Factors on Science Attrition Among College-Bound Secondary Students
Ann M. Liberatore, Syracuse University

50P Building an Organized Knowledge Base: Concept Mapping and Achievement in Secondary School Physics
William J. Pankratius, Cobb County School System, Georgia

THURSDAY, MARCH 30

10:15 - 11:45 A.M.

North

POSTER SESSION: Research on Learning and Instruction II

Presider:

Lynn Dierking
University of Maryland at College Park

Presenters:

- 5 1st Generalizing the Forward Transfer Effect to Science Films
Laura Barden, University of Maryland
William G. Holliday, University of Maryland
- 5 2 Go For What You Know: Using Socio-linguistic Analysis to Understand Apparent Off-task Behavior in a Biology Classroom
David A. Cline, Michigan State University
- 5 7 Scoring Concept Maps: A Comparison of Methods
Kathryn F. Cochran, University of Northern Colorado
- 5 4 A Short Treatment Program To Increase Cognitive Functioning, Creativity, and Synthesizing Ability
Yvonne Baron Estes, The University of Texas at Austin
James P. Barufaldi, The University of Texas at Austin
- 5 5 Enhancing Learning in the Life Science Lab
Thomas R. Lord, Burlington County College

- 56 Influence of Procedural Complexity on Content Talk During Small-Group Work in Science
Shirley J. Magnusson, University of Michigan
- 57 A Survey Instrument for Qualitative and Quantitative Examination of "Hands-on-Science" Instruction Using Videotape-Jury Review Techniques
J. Preston Prather, University of Tennessee at Martin
Nancy Walters, University of Tennessee at Martin
Bob Hartshorn, University of Tennessee at Martin
- 58 Toward the Development of an Elementary Teacher's Science Teaching Efficacy Belief Instrument
Iris Riggs, California State University
Larry Enochs, Kansas State University
- 59 The Influence of a Diversified Instructional Strategy on an Understanding of the Nature of Scientific/Evolutionary Theory
Lawrence C. Scharmann, Kansas State University
- 60 Modification and Validation of a Test of Basic Process Skills Using Different Methods of Test Administration
Meghan Twiest, Indiana University of Pennsylvania
Mark Twiest, Indiana University of Pennsylvania
- 61 Hypothetico-Deductive Logic, Science Process Skills and Biology Learning
Miriam Wellicker, Technion
Michal Shemesh, Technion
- 62 An Electricity Unit: Providing Learning Disabled Students Opportunities for Success
Elizabeth A. Wier, University of Delaware
- 63 Students' Paradigms, Spontaneous and Acquired
Safa Zaid, Michigan State University

THURSDAY, MARCH 30

10:15 - 11:45 A.M.

South

POSTER SESSION: Research Preservice and Inservice Teacher Education

Presider:

John Falk
Science Learning, Inc.

Presenters:

- 64 Influencing Preservice Elementary Teachers' Views of Science Through "Search for Solutions" Film Series
Betty Crocker, University of North Texas
- 65 The Influence of Professional Education and Internship Experiences on the Beliefs of Pre-Service Secondary Science Teachers
Linda L. Cronin, University of Florida
- 66 The Effect of an In-Service Science Teacher Education Program on Elementary Science Teaching
Pamela Fraser-Abder, The University of the West Indies
- 67 Using Quantitative and Qualitative Evaluation Methods to Compare Teacher Inservice Participants' and Non-Participants' Perceptions of Their Motivation to Learn
Brenda K. Johnson, Sioux Falls College
- 68 Current Models in Philosophy of Science: Their Place in Science Teacher Education
Cathleen Loving, The University of Texas at Austin

69^p Influence of Research in Science Education on Science Teaching Practices: Perspectives from Nigeria

Peter Akinsola Okebukola, Lagos State University

Olugbemiro J. Jegede, Curtin University

G. A. Ajewole, Lagos State University

70 Evaluations of a Teacher Training Program in the Science and Ethics of Recombinant DNA

Kathleen A. O'Sullivan, San Francisco State University

71 A Quantitative Investigation Concerning Scientific Literacy Among High School and Undergraduate Science Education Majors

Dawn Pickard, Oakland University

Kathryn Linden, Purdue University

72 The Effects of an STS Teacher Education Unit on the STS Content Achievement and Participation in Actions on STS Issues by Preservice Science Teachers

Peter A. Rubba, The Pennsylvania State University

73 The Influence of Methods Instruction on the Beliefs of Pre-Service Elementary and Secondary Science Teachers: Preliminary Comparative Analyses

Edward Shaw, University of South Alabama

Linda L. Cronin, University of Florida

74 The Influence of Preservice Secondary Science Teachers' Beliefs and Knowledge on Lesson Planning and Teaching Behavior

Hsiao-Lin Tuan, The University of Georgia

Zurida Ismail, The University of Georgia

THURSDAY, MARCH 30

1:00 - 2:30 P.M.

Cable

SYMPOSIUM TOPIC: Science History and Teaching Science

President:

Glenn D. Berkheimer
Michigan State University

Discussant:

Alan J. McCormick
San Diego State University

Presenters:

- 15 Foundations of Science — A Historical Storyline Approach
Ezra Shahn, Hunter College
- 25 Concepts of a Solar System in Tandem With Scientific Method
Alfred Bennick, Hunter College
- 35 Atomic/Molecular Structure — Logical or Chronological Order
David Lavallee, Hunter College
- 45 Double Indemnity — Students' Separation of History and Science
Richard Duschl, Hunter College

1:00 - 2:30 P.M.

Savoy

ROUND TABLE DISCUSSIONS

Presider:

Protema Roy
Druey College

Presenters:

Attitudes and Stereotyping in Science: Trends and Transitions K-12

Dale Baker, University of Utah
Dale Niederhauser, University of Utah
Michael Piburn, Westminster College

Students' Intuitions and Science Instruction: A Collaborative Research Programme

Galen L. Erickson, University of British Columbia
Jose Aguirre, University of British Columbia
Bruce Gurney, North Vancouver School District
Allan Mackinnon, University of Toronto
Gerry Sieber, Coquitlam School District

THURSDAY, MARCH 30

1:00 - 2:30 P.M.

Sutter 1/2

SYMPOSIUM: Using Portfolios to Capture the Performance of High School Biology Teachers: The Work of the Biology Component of the Teacher Assessment Project

Presider:

Patricia S. McDaniel
Southeast Missouri State University

Discussant:

Charles W. Anderson
Michigan State University

Presenters:

Angelo Collins, Stanford University
David Cobb, Menlo School
Douglas Wong, Piedmont Hills High School
Stan Ogren, Menlo-Atherton High School
Nancy Stevens, San Rafael High School

1:00 - 2:30 P.M.

Sutter 3

CONTRIBUTED PAPERS: Research on Cognition

Presider:

Michael J. Padilla
University of Georgia

Discussant:

Shawn Glynn
University of Georgia

Papers:

- 1C Developmental Patterns in Logical Reasoning of Students in Grades Six through Ten: Increments and Plateaus
Betty L. Bitner, Southwest Missouri State University
- 2 Practicals and the Acquisition of Academic Skills
Paul A. Kirschner, Open University of the Netherlands
- 3 Using Qualitative and Quantitative Methods in a Study of Higher-Level Cognitive Learning in Grade 10 Science Classrooms
Leonie J. Rennie, Curtin University of Technology
Barry J. Fraser, Curtin University of Technology
Kenneth Tobin, Florida State University
- 4 A Comparative Study of Logical Thinking Skills: West Germany Data
Richard L. Williams, University of Victoria

ROUND TABLE DISCUSSIONS:

Presider:

Ertle Thompson
University of Virginia

Presenters:

32 A Symposium on STS: What is It and Its Research Agenda

Lloyd Barrow, University of Missouri

Robert E. Yager, University of Iowa

Rodger W. Bybee, Biological Sciences Curriculum Study

Peter Rubba, Pennsylvania State University

Ron Bonnstetter, University of Nebraska

Fred Staley, Arizona State University

4/R Linking Gender Inequity to Educational Productivity on the International Scene

James R. Campbell, St. John's University

George DeBoer, Colgate University

George Flouris, University of Crete

Francine S. Mandel, St. John's University

John Spiridakis, St. John's University

Yasuhiro Uto, Japanese Public Schools

Rosalind Wu, Taiwan Provincial Institute

Jane Butler Kahle, Purdue University

5 K
Development and Evaluation of a Model Inservice Program for Secondary School Science Teachers

Edmund A. Marek, University of Oklahoma

Susan L. Westbrook, University of Oklahoma

Richard J. Bryant, University of Oklahoma

ROUND TABLE DISCUSSIONS

Presider:

Carl F. Berger, University of Michigan

Presenters:

6 What Is and What Ought To Be

Paul J. Kuerbis, National Center for Improving Science Education

Rodger W. Bybee, Biological Sciences Curriculum Study

Susan Loucks-Hursley, The Network, Inc.

Senta S. Raizen, National Center for Improving Science Education

7 Middle Grades Science Teacher Education: Academic and Professional Development

Michael J. Padilla, University of Georgia

Hsiao Lin Tuan, University of Georgia

Russell Yeany, University of Georgia

Teresa Kokoski, University of Georgia

Carl Berger, University of Michigan

Dorothy Gabel, Indiana University

8R Improving Teaching by Changing the Metaphorical Basis for Conceptualizing Teacher Roles

Kenneth Tobin, Florida State University

Sarah L. Ulerick, Florida State University

Jere Holman, Florida State University

2:45 - 4:15 P.M.

Cable

6 SYMPOSIUM: Methodological Issues in a Multi-Site Cross-Country Comparative Study of Elementary Science Implementation

Presider:

J. David Lockard
University of Maryland

Discussants:

Arthur L. White
Ohio State University

Presenters:

Ronald D. Anderson, University of Colorado
Unc Hameyer, Institute for Science Education
Jan vander Akker, Tweve University
Mats Ekholm, School Leader Education, Sweden

THURSDAY, MARCH 30

2:45 - 4:15 P.M.

Savoy

CONTRIBUTED PAPERS: Research on Science Laboratories

President:

Bonnie J. Brunkhorst
California State University

Discussant:

Gerald L. Abegg
Boston University

Presenters:

5< A Comparison of Two Instructional Strategies Involving Science Laboratory Activities

Jerry E. Ivins, Northwest Local School District

Glenn Markle, University of Cincinnati

6 A Review of Research on Science Laboratory Instruction at the College Level

William H. Leonard, Clemson University

2:45 - 4:15 P.M.

Sutter 1/2

PANEL: Ethics in Field-Based Research

Presider:

Paul H. Joslin
Drake University

Discussant:

Stanley L. Helgeson
The Ohio State University

Presenters:

Nancy Brickhouse, University of Delaware
William C. Kyle, Jr., Purdue University
Kenneth G. Tobin, Florida State University
Steve Goldberg, Beaver College
John E. Penick, University of Iowa
Sarah Ulerick, Florida State University

THURSDAY, MARCH 30

2:45 - 4:15 P.M.

Sutter 3

7 SYMPOSIUM: Models of Collaborative Research: University Faculty and Classroom Teachers as Partners and Peers

Presider:

Karen Ostlund
Southwestern Texas University

Discussant:

Thaddeus W. Fowler
University of Cincinnati

Presenters:

Ann C. Howe, organizer, North Carolina State University

7 Teachers as Researchers at the Classroom Interaction Research Laboratory

C. Thomas Gooding, SUNY at Oswego

8 Teachers as Equal Research Partners'

Catherine Conwell, University of North Carolina-Cherlotte

9 Academic Challenge Program: Collaboration in Innovation and Evaluation

Donna F. Berlin, Ohio State University at Newark

105 Incorporating New Technologies and Strategies Into the Curriculum

Glenda Carter, North Carolina State University

2:45 - 4:15 P.M.

North

ROUNDTABLE DISCUSSIONS

Presider:

Willis Horak
University of Arizona

Presenters:

Results of the Practical Laboratory Process Tests in the Second International Science Study

- 9 Pinchas Tamir, Israel
- Peter Vari, Hungary
- Yeoh Oon Chye, Singapore
- Pisarn Soydhurum, Thailand
- Rodney Doran, United States

10 Rural Science Teaching: Characteristics, Pre- and Inservice Preparation, and Research

- Larry G. Enochs, Kansas State University
- Emmett L. Wright, Kansas State University
- John Staver, Kansas State University
- J. Steve Oliver, Kansas State University
- Lawrence C. Scharmann, Kansas State University

THURSDAY, MARCH 30

2:45 - 4:15 P.M.

South

ROUND TABLE DISCUSSIONS:

Presider:

Jennifer Dodd

University of Maine at Orono

Presenters:

// Interactions of Epistemology and Ethics in Science Education

Carolyn S. Carter, Ohio State University

J. Dudley Herron, Purdue University

Andrew Ahlgren, American Association for the Advancement in Science

Paul Cobb, Purdue University

Etna Yackel, Purdue University

Barbara Thomson, The Ohio State University

Jean Smith, The Ohio State University

M The Relationship Between the Development of Process Skills and the Development of Logical Thinking

John T. Norman, Wayne State University

Derrick R. Lavoie, Wayne State University

Mary K. Jones, Wayne State University

Rochelle Rubin, Wayne State University

13R
Implications of Writing-To-Learn Research for Science Education

Karen S. Sullenger, University of Georgia

Rosemary Gates, The Catholic University of America

Robert Tierney, Fremont, California

Mary Sue Ammon, University of California

Paul Ammon, University of California

Audrey Champagne, A.A.A.S., Discussant

THURSDAY, MARCH 30

4:30 - 5:30 P.M.

Ballroom

General Session

Presider:

Mary Lou Koran, University of Florida

Presenters:

Designing Invitations to Thinking

John D. Bransford, Vanderbilt University

8:15 - 9:45 A.M.

Cable

CONTRIBUTED PAPERS: Research on Policy, Philosophy, and History

President:

Maria B.A. Monteiro
Michigan State University

Discussant:

Bonnie Brunkhorst
California State University, San Bernadino

- 7 Science Education in the 1970's and 1980's
Edith Yi-Tan Chang, Columbia University
- 8 A Conceptual Framework for Incorporating Topics from the History and Philosophy of Science
Richard Duschl, Hunter College
- 9C The Impact of a National Study on the Policy and Practice of Science Teaching in British Columbia
Marvin F. Wideen, Simon Fraser University
Barbara Moon, Fraser Valley College

FRIDAY, MARCH 31

8:15 - 9:45 A.M.

Savoy

CONTRIBUTED PAPERS: Research on Gender Differences

Presider:

Robert A. Monteiro
Michigan State University

Discussant:

David P. Butts
University of Georgia

Papers:

- 10 Those Who Can But Don't: Trends in Educating Young Women for Careers in Engineering in Singapore
Margaret S. Gremler, Institute for Southeast Asian Studies
- 11 Characteristics of Female Advanced Science Students—Second IEA Science
Sue Humrich, Columbia University
- 12 Development of a Theoretical Basis for Gender Difference in Interest Levels
Jane Butler Kahle, Purdue University
- 13 Women Scientists' Construction of Knowledge & Learning in Science
Patricia Kerr, University of North Dakota

8:15 - 9:45 A.M.

Sutter 1/2

CONTRIBUTED PAPERS: Research on Curriculum Evaluation

Presider:

Juan M. Esquivel
Universidad de Costa Rica

Discussant:

Lowell J. Bethel
University of Texas at Austin

Presenters:

- 14 Development, Trial Implementation and Evaluation of an Interpretive Interactive Media Program for a Natural History Exhibit
David Denning, University of Victoria
Larry D. Yore, University of Victoria
- 15 A Comparative Evaluation of Inquiry Activities in High School Biology Curricula of Korea and the United States
Myung Hur, Korea National University of Education
- 16 Impact of Large-Scale Testing on Secondary School Science Education
George Ivany, Simon Fraser University
Marvin F. Wideen, Simon Fraser University
Thomas O'Shea, Simon Fraser University
Alden Sherwood, Simon Fraser University
- 17C A Study of the Implementation of the Texas Elementary Science Program
Roberta Sawin, Texas A&M University

FRIDAY, MARCH 31

8:15 - 9:45 A.M.

Sutter 3

Research Seminar with John Bransford

Presider:

Robert D. Sherwood, Vanderbilt University

Presenter:

John D. Bransford, Vanderbilt University

8:15 - 9:45 A.M.

North

CONTRIBUTED PAPERS: Research on Conceptual Change I

Presider:

Michael Piburn
Westminster College

Discussant:

Anton E. Lawson
Arizona State University

Presenters:

18 The Matter and Molecules Project: Curriculum Development Based on Conceptual Change Research
Glenn D. Berkheimer, Michigan State University
Charles W. Anderson, Michigan State University

19 Middle School Teachers' Conceptions of Heat and Temperature: Personal and Teaching Knowledge
Joseph S. Krajcik, University of Maryland at College Park
John W. Layman, University of Maryland at College Park

20 Misconceptions in the Earth Sciences: A Cross-Age Study
Kenneth J. Schoon, Indiana University-Northwest

FRIDAY, MARCH 31

8:15 - 9:45 A.M.

South

CONTRIBUTED PAPERS: Research on Instructional Projects

President:

Reg Fleming
University of Saskatchewan

Discussant:

Patricia Swift
SUNY-Oswego

Papers:

- 21 Correlates of Performance in the Science Olympiad
William E. Baird, Auburn University
W. D. Perry, Auburn University
Marllin Simon, Auburn University
- 22 Profile, Anatomy, and Effectiveness of College Science Distance Teaching As Compared to a Traditional Mode College Science Course
Linda W. Crow, Baylor College of Medicine
- 23 Take Home Science Kits for Families
Gene Gennaro, University of Minnesota
Frances Lawrenz, University of Minnesota
- 24 T-zone, Target Students and Science Classroom Interactions
Gail Jones, University of North Carolina

FRIDAY, MARCH 31

56

8:15 - 9:45 A.M.

Room 2918

An Opportunity to Discuss Issues with the President of NARST

Presider:

Frances Lawrenz, University of Minnesota

President:

Patricia Blosser

The Ohio State University

FRIDAY, MARCH 31

10:00 - 11:30 A.M.

Cable

CONTRIBUTED PAPERS: Research on the Elementary School

President:

Nancy R. Romance
Florida Atlantic University

Discussant:

Rodger Bybee
Biological Sciences Curriculum Study

Papers:

- 25 Science Achievement of Costa Rican Sixth Grade Students and Its Relationship With Selected Variables
Juan M. Esquivel, Universidad de Costa Rica
Sofia M. Diaz, Universidad de Costa Rica
- 26 Teaching Elementary Children an Analogy Operationalizes Their Descriptions of the States of Water
Larry Flick, University of Oregon
- 27 The Relationships of Achievement, Instruction, and Family Background to Elementary School Science Achievement in the Republic of China
Tien-Ying Lee, Taiwan Provincial Taipei Teachers College
- 28 How Do Children Develop Science Knowledge? An Interim Report of Trends from a Longitudinal Study
C. Nicholas Hastings, Center for the Study of Reading
Linda A. Meyer, Center for the Study of Reading
James L. Wasdrop, Center for the Study of Reading

10:00 - 11:30 A.M.

Savoy

SYMPOSIUM TOPIC: A Candid Discussion on Enhancing our Journal

Presider:

William G. Holliday
University of Maryland at College Park

Presenters:

Glen Aikenhead, University of Saskatchewan
Ronald G. Good, Louisiana State University
John J. Koran, Jr., University of Florida
Anton Lawson, Arizona State University
Marcia C. Linn, University of California, Berkeley
Joseph D. Novak, Cornell University
James A. Shymansky, University of Iowa
Russell H. Yeany, University of Georgia

CONTRIBUTED PAPERS: Research on Learner Characteristics

President:

William H. Leonard
Clemson University

Discussants:

Barry J. Fraser
Curtin University

Papers:

- 29 Relationships Among Integrated Science Process Skill Achievement, Logical Thinking Abilities, and Academic Science Achievement of Tenth Grade Public School Students in Taipei, Taiwan, R.O.C.
Chao-Ti Hsiung, Taiwan Provincial Taipei Teachers College
- 30 Middle School Students' Perceptions of Factors Facilitating Learning Science
Barbara S. Spector, University of South Florida
Charles W. Gibson, Largo High School
- 3 Relationships Among Cognitive Style, Formal Reasoning Ability, Psychosocial Environment, Robustness, and Cognitive and Affective Outcomes in Eighth and Ninth Grade Science Classrooms
Barbara Strawitz, Louisiana State University
Ron Good, Louisiana State University
Chad Elleh, Louisiana State University
Bobby Franklin, Louisiana State University
Faimon Roberts, Louisiana State University

10:00 - 11:30 A.M.

Sutter 3

CONTRIBUTED PAPERS: Research on Conceptual Change II

President:

Gerald L. Abegg
Boston University

Discussant:

David F. Treagust
Curtin University

Papers:

32 Conceptual Change Strategies and Cooperative Group Work in Chemistry: An Experiment
Patricia A.K. Basili, Prince George's Community College

33 A Study of Conceptual Change in Junior High School Students During Instruction About the Concept of Burning
Saouma Boujaoude, Syracuse University

34 Identifying and Changing Children's Beliefs About Circular Motion
Herb Lamb, Durham Academy Lower School

FRIDAY, MARCH 31

10:00 - 11:30 A.M.

2918

CONTRIBUTED PAPERS: Research on Inservice Projects

President:

Dennis E. Showers
SUNY-Geneseo

Discussants:

Donald W. McCurdy
University of Nebraska

Presenters:

35 Helping Science Teachers Help Science Teachers: A Study of Change in Junior High School Science

Antonio Bettencourt, Michigan State University

James J. Gallagher, Michigan State University

36 Three Perspectives on the Problems Facing the Science Teaching Profession: A Cross-Nation Comparison

Geoff Giddings, Curtin University of Technology

37 Computers to Enhance Science Education: An Inservice Designed to Foster Classroom Implementation

Jo Ellen Roseman, Johns Hopkins University

Mary Ann Brearton, Maryland State Department of Education

2:15 - 3:45 P.M.

Cable

SYMPOSIUM: Issues in Current Problem-Solving Research

Presider:

David R. Stronck
California State University, Hayward

Discussant:

Dorothy Gabel
Indiana University

Presenters:

12⁵ Definitional Issues in Current Problem-Solving Research
Mike U. Smith, Mercer University

13⁵ Beliefs and Problem Solving: Implications for Research
Carolyn Carter, The Ohio State University

14⁵ Genetic Problem-Solving With and Without Initial Verbal to Visual Recoding of Data
Judith Kinnear, Latrobe University

15⁵ Transfer Problems: A Historical Perspective and an Organizational Scheme for Guiding Future Research
William C. Robertson, Biological Science Curriculum Study

16⁵ Everyday Problem-Solving: Dollar-Wise, Penny Foolish
Mary E. Brenner, University of California, Berkeley

FRIDAY, MARCH 31

2:15 - 3:45 P.M.

Savoy

CONTRIBUTED PAPERS: Research on Text Designs

President:

Richard R. Tolman
Brigham Young University

Discussant:

Pamela Fraser-Abder
The University of the West Indies

Presenters:

The Use of Linguistic Content Analysis to Assess the Image of Science in Textbooks

38 Elizabeth M. Eltinge, Texas A&M University

39 Profiling Elementary Text-Related Science Instructional Materials

Robert H. Evans, Wake Forest University

40 An Analysis of the Questioning Level of Junior High School Science Textbooks

Daniel P. Shepardson, The University of Iowa

C Edward L. Pizzini, The University of Iowa

Sandra K. Abell, Purdue University

FRIDAY, MARCH 31

64

2:15 - 3:45 P.M.

Sutter 1/2

INVITED SESSION: Do's and Don'ts of Writing Fundable Proposals

Presider:

Peter M. Mecca
SUNY at Oneonta

Presenters:

Emmett L. Wright, Kansas State University
Larry G. Enochs, Kansas State University

FRIDAY, MARCH 31

2:15 - 3:45 P.M.

Sutter 3

PAPER SET: Cognition in Informal Science Settings: Reviewing Visitor Research Studies

Presider:

Mary Atwater
University of Georgia

Discussant:

Fred Finley
University of Minnesota

Papers:

1 Long-term Cognitive Learning from Field Trips: A Look at the Evidence
Lynn D. Dierking, University of Maryland at College Park
John H. Falk, Science Learning, Inc.

2 The Long-Term Effect of 200 Programs on Visitor Attitudes and Behavior
Piyush Swami, University of Cincinnati
Murali Potluri, University of Cincinnati
Julie Gallenstein, University of Cincinnati

3 Effects of Perspective and Perception on Visitors in Informal Settings
John J. Koran, Jr., University of Florida
Mary Lou Koran, University of Florida
John Scott Foster, University of Florida
Ann Donnelly, University of Florida

FRIDAY, MARCH 31

69

2:15 - 3:45 P.M.

Room 2918

Presider:

Sandra K. Abell
University of Iowa

An "Hour" with
NARST Research Coordinator
Rodger W. Bybee, Biological Sciences Curriculum Study

The Editor of the
Journal of Research in Science Teaching

Russell Yeany
University of Georgia

FRIDAY, MARCH 31

4:00 - 5:30 P.M.

Cable

PAPER SET: Representation and Problem-Solving

President:

John R. Staver
Kansas State University

Discussant:

Peter W. Hewson
University of Wisconsin-Madison

Presenters:

- 4 The Role of Metacognition and the Computer as a Self-Referent in Solving Simple Kinematics Problems
Alan Naimoli, Rutgers University
- 5 Multiple Representations in Accommodating Task Attributes
Frank Gagliardi, Rutgers University
- 6 Gender Differences: Novice Problem-Solving Attributes
Sheila F. Pirkle, Southeastern Louisiana University
- 7 Cultural Constructs in Problem-Solving: Analysis of Qualitative Representation
Daulat N. Husain, Rutgers University

4:00 - 5:30 P.M.

Savoy

SYMPOSIUM: Information Technologies and Science Education: The 1988 AETS Yearbook

Presider:

James D. Ellis

Biological Sciences Curriculum Study

Presenters:

17 Tools for Science Education

Robert F. Tinker, TERC

18 Using Telecommunications to Do and Learn Science

Cecilia Lenk, TERC

19 Optical Technologies: Current Status and Possible Directions for Science

Robert Sherwood, Vanderbilt University

20 Teachers' Use of Information Technology

Carl Berger, University of Michigan

21 To be announced

Marcia C. Linn, University of California, Berkeley

22 The Effects of Using Computing Technologies in Science Instruction: A Synthesis of the Findings and Features of Classroom-Based Research

Kevin C. Wise, Southern Illinois University

- ²³ Status of Microcomputer Uses in Science Teaching: Past, Present, and Future
Bill Baird, Auburn University
- ²⁴ Integrating Information Technologies into Instruction: The Voyage of the Mimi
Laura Martin, Bank Street College
- ²⁵ Information Technology in Science Education
Roger Johnson, University of Minnesota
- ²⁵ Using Change Theory to Manage the Implementation of Educational Technology in Science Classrooms
Bob James, Texas A&M University

FRIDAY, MARCH 31

1:00 - 5:30 P.M.

Sutter 1/2

INVITED SESSION: Strategies in Acquiring Grants & Contracts

Presider:

James P. Barufaldi

University of Texas at Austin

Presenters:

Allen Schmieder, Chief, Title II Grants, Department of Education

FRIDAY, MARCH 31

4:00 - 5:30 P.M.

Sutter 3

27 SYMPOSIUM: Epistemological Issues in Science Education

Presider:

Lehman Barnes
Florida State University

Discussant:

Galen Erickson
University of British Columbia

Presenters:

Joseph D. Novak, Cornell University
Patricia Kerr, University of North Dakota
Kathy Edmondson, Cornell University
Stuart Donn, University of British Columbia
William Cobern, Austin College

4:00 - 5:30 P.M.

North

SYMPOSIUM: Teaching Science Concepts With Analogies

President:

William Cobern
Austin College

Discussants:

Audrey Champagne
A.A.A.S.

Patricia Simmons
University of Georgia

Papers:

28⁵ Teaching Photosynthesis to Middle School Students Using Analogies

Pamela Sloan, University of Georgia

29⁵ Promoting Learning Through the Use of Analogies in High School Biology Students

David Radford, University of Georgia

30⁵ Explaining Physical Science Concepts: A Teaching With Analogies (TWA) Model

Shawn Glynn, University of Georgia

FRIDAY, MARCH 31

4:00 - 5:30 P.M.

South

CONTRIBUTED PAPERS: Research on Process Skills

President:

Carol L. Stuessy
University of Oklahoma

Discussants:

Michael J. Padilla
University of Georgia

Papers:

Process Science and Standardized Testing: Are They Compatible?

- 41 Thomas Gadsden, Jr., Northrich Elementary School
William C. Kyle, Jr., Purdue University
Ronald J. Bonnstetter, The University of Nebraska
Marian Wolff, The University of Connecticut
Francis X. Archambault, University of Connecticut

The Development of the Performance of Process Skills (POPS) Test for Middle Grades

- 42 Floyd E. Mattheis, East Carolina University
Genzo Nakayama, East Carolina University

A Qualitative Analysis of Student Responses on a Test of Basic Process Skills

- 43 Mark Twiest, Indiana University of Pennsylvania
Meghan Twiest, Indiana University of Pennsylvania

4:00 - 5:30 P.M.

Room 2918

CONTRIBUTED PAPERS: Research on Science Teaching

President:

Leon Zalewski
Governors State University

Discussant:

J. Nathan Swift
SUNY at Oswego

Presenters:

A Study of the Importance of Reflection for Improving Science Teaching and Learning

44
John R. Baird, Monash University
Richard F. Gunstone, Monash University
Richard T. White, Monash University
Peter Fenshaw, Monash University

Biology Content Cognitive Structures of Biology Majors, Biology Teachers and Scientists

47
Pat Hauslein, Louisiana State University
Ron Good, Louisiana State University

University Researchers' Inchoate Critiques of Science Teaching: A Case for the Study of Education

48
Deborah J. Trumbull, Cornell University
Pat Kerr, University of North Dakota

The Development of Science Content Pedagogy and the Impact on Pupil Learning

417
Michael E. Hale, University of Georgia
Russell H. Yeany, University of Georgia

FRIDAY, MARCH 31

8:30 - 10:00 P.M.

Networking Groups and Presiders

General

Presider:

Kenneth Tobin, Florida State University

Presenters:

Attitude Research

Robert L. Shrigley, The Pennsylvania State University

Constructivist Research

Anton E. Lawson, Arizona State University

Ethnographic Research in Science Classrooms

Kenneth Tobin, Florida State University

James J. Gallagher, Michigan State University

International Science Education Research

Arthur L. White, The Ohio State University

Misconceptions Research

Joseph D. Novak, Cornell University

Problem Solving Research

Mike U. Smith, Mercer University School of Medicine

Research on Memory Systems

Marianne Betkouski-Barnes, University of North Florida

Science-Technology-Society Research

Peter A. Rubba, The Pennsylvania State University

Use of Computers in Science Education

Gerald L. Abegg, Boston University

SATURDAY, APRIL 1

8:15 - 9:45 A.M.

Cable

CONTRIBUTED PAPERS: Research on Learning

President:

Pamela Fraser-Abder
The University of the West Indies

Discussant:

James J. Gallagher
Michigan State University

Papers:

1 The Influence of Tasks on Students' Motivation and Thought in Science

Phyllis C. Blumenfeld, The University of Michigan
Judith L. Meece, University of North Carolina

2 The Rejection of Nonscientific Beliefs as a Function of Instruction and Reasoning Ability

Anton E. Lawson, Arizona State University
John Weser, Arizona State University

3 Controlling One's Own Comprehension in Learning Science: Evaluation and Regulation Strategies

José C. Otero, Universidad de Alcala
Juan M. Campanario, Universidad de Alcala

4 Achievements in Eighth-Grade Science by Boys and Girls of Five Ethnic Groups

David R. Stronck, California State University, Hayward

CONTRIBUTED PAPERS: Research on Teacher Characteristics I

Presider:

Michael Piburn
Westminster College

Discussant:

Linda DeTure
Rollins College

Papers:

5 A Longitudinal Study of Student Outcomes and Teacher Characteristics in Exemplary Middle and Junior High Science Programs

Bonnie J. Brunkhorst, California State University

6 The Relationships Among Alternative Physical Science Conceptions, Formal Reasoning Ability, and Science Background of Preservice Teachers

George E. Glasson, Virginia Polytechnic Institute & State University

Thomas G. Teates, Virginia Polytechnic Institute & State University

7 Qualitative and Naturalistic Research Study on Exemplary Chemistry Teachers

Avi Hofstein, The Weizmann Institute of Science

Ruth Ben-Zvi, The Weizmann Institute of Science

Miriam Carneli, The Weizmann Institute of Science

8 Intellectual Development, Science Anxiety, and Content Achievement in Preservice Elementary Teachers

Donald W. McCurdy, University of Nebraska-Lincoln

Peggy Tilgner, University of Nebraska-Lincoln

Mary Staley, University of Nebraska-Lincoln

Donald Hall, St. Cloud University

SATURDAY, APRIL 1

8:15 - 9:45 A.M.

Sutter 3

CONTRIBUTED PAPERS: Research on Attitude I

Presider:

Marvin Wideen
Simon Fraser University

Discussant:

James A. Shymansky
University of Iowa

Papers:

Monitoring Student Views on Science-Technology-Society Topics Using a Multiple Choice Format

9 Glen Aikenhead, University of Saskatchewan
Alan Ryan, University of Saskatchewan
Jacques DeSautels, Université Laval

10 Changes in Attitudes of Urban Middle School Students

Mary M. Atwater, University of Georgia

Teacher Attitudes and Teaching Strategy Effectiveness

11 Kathryn F. Cochran, University of Northern Colorado
Iva E. Lindauer, University of Northern Colorado
James A. DeRuiter, University of Northern Colorado

12 Persuasion and Attitude Change in Science Education

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

8:15 - 9:45 A.M.

North

CONTRIBUTED PAPERS: Research on Problem Solving I

President:

Donn Berlin
Ohio State University of Newark

Discussant:

Paul J. Kuerbis
Biological Sciences Curriculum Study

Papers:

Using Categorization to Enhance Chemistry Problem Solving Skills

Diane M. Bunce, Catholic University of America

13 Dorothy Gabel, Indiana University

Naturalistic and Psychometric Performance of Expert/Novices on the Categorizational Chemical Equilibrium Problems

14 Moises Camacho, InterAmerican University of Puerto Rico

Cooperative Grouping and Chemistry Problem Solving

15 Ron Good, Louisiana State University

Joy Tingle, Louisiana State University

The Use of Core Propositions in Solving Current Electricity Problems

16 Patricia Heller, University of Minnesota

Fred Finley, University of Minnesota

CONTRIBUTED PAPERS: Research on Teacher Knowledge

Presider:

Marlene M. Milkent
University of Southern Mississippi

Discussant:

Hannah J. Arzi
University of Arizona

Papers:

Teacher Knowledge and Teacher Planning: The Impact of Subject-Matter Knowledge on the Science Curriculum

17 William S. Carlsen, Cornell University

The Influence of Intensive Inservicing on Pedagogical Content Knowledge Growth Among Novice Chemical Demonstrators

18 Christian P. Clermont, University of Maryland at College Park
Joseph Krajcik, University of Maryland at College Park

Accuracy of Teachers' Knowledge About Students' Scientific Thinking

19 Robert E. Hollon, University of Wisconsin-Madison

The Effect of Training Content Knowledge and Strategic Knowledge on Analogical Reasoning and Domain Knowledge Structure

20 Victor L. Willson, Texas A&M University
Patricia A. Alexander, Texas A&M University
Ernest T. Goetz, Texas A&M University
Jonna Kulikowich, Texas A&M University

8:15 - 9:45 A.M.

Room 2918

CONTRIBUTED PAPERS: Research on Concept Learning

Presider:

Nancy Romance
Florida Atlantic University

Discussant:

Essie C. Beck
Jefferson Parrish Schools

Papers:

Children's Concepts of Seasons — A Comparison of Three Interview Techniques

21 Linda B. Furuness, Indiana University
Michael R. Cohen, Indiana University

Difficulties Experienced by Senior High School Chemistry Students of Electrochemistry: Electric Circuits and Oxidation-Reduction Equations

22 Pamela Garnett, Curtin University of Technology
David Treagust, Curtin University of Technology

An Analysis of Students' Errors on an Examination Question That Assessed Their Knowledge of the Relation Between the Atomic/Molecular and Molar Masses of a Substance

23 John R. Staver, Kansas State University

The Botanical Classifications and Concepts of Students Prior to Seventh Grade Life Science Instruction — an Ethnographic Approach

24 Delena Tull, University of Texas at Austin

SATURDAY, APRIL 1

10:00 - 11:30 A.M.

Cable

CONTRIBUTED PAPERS: Research on Teacher Strategy

President:

Joseph P. Riley, III
University of Georgia

Discussant:

John E. Penick
University of Iowa

Papers:

- 2⁵ Intentions of Science Teachers to Use Investigative Teaching Methods: A Test of the Theory of Planned Behavior
Frank E. Crawley, University of Texas at Austin
- 2⁶ Teaching Inventiveness: A Development Program
Alan J. McCormack, San Diego State University
- 2⁷ Enhancement of Teacher Decision Making in Science Classroom Lessons
Dennis W. Sunal, West Virginia University

10:00 - 11:30 A.M.

Sutter 1/2

CONTRIBUTED PAPERS: Research on Teacher Characteristics II

Presider:

Meghan Twiest
Indiana University of Pennsylvania

Discussant:

Kathryn F. Cochran
University of Northern Colorado

Papers:

28 Teachers' Views of Technology: A Research Report
Reg Fleming, University of Saskatchewan

29 A Qualitative Analysis of the Effects of a Microteaching Course on Preservice Science Teachers' Instructional Decisions and Beliefs About Teaching
Norman G. Lederman, Oregon State University
Julie Gess-Newsome, Oregon State University

30 Short-term and Long-term Increases in Confidence Levels of Inservice Elementary and Middle/Junior High School Science Teachers
Catherine Yeotis, Wichita State University
Linda Bakken, Wichita State University

31 The Effects of a Summer Inservice Program on Secondary Science Teachers' Stages of Concerns, Attitudes and Knowledge of Selected STS Concepts and Its Impact on Students
Edward J. Zielinski, Clarion University
John A. Bernardo, Buhl Science Center

SATURDAY, APRIL 1

10:00 - 11:30 A.M.

Sutter 3

CONTRIBUTED PAPERS: Research on Attitudes II

President:

William J. Kermis
University of Lowell

Discussant:

Rodney L. Doran
SUNY at Buffalo

Papers:

The Development and Validation of an Inventory to Measure Students' Attitudes Towards Science Field Trips

32 Nir Orion, The Weizmann Institute of Science
Avi Hofstein, The Weizmann Institute of Science

Attitudes, Beliefs, and Intentions Toward Science Education of Junior High School Students

5 J. Steve Oliver, Kansas State University
David W. Brown, Kansas State University

Clarification of the Direction of the Affect - Achievement Relationship in Science

24 Keith F. Punch, University of Western Australia
Leonie J. Rennie, Curtin Institute of Technology

10:00 - 11:30 A.M.

North

CONTRIBUTED PAPERS: Research on Problem Solving II

Presider:

Nancy T. Davis
Florida State University

Discussant:

George Ivany
Simon Fraser University

Papers:

35 The Effect of a Problem Solving Inservice Program on the Classroom Behaviors and Attitudes of Middle School Science Teachers
Sandra K. Abell, Purdue University

36 Implementation of a Problem Solving Curriculum in Elementary Science: Case Studies of Teachers in Change
Mary Lee Martens, St. Johns University

37 Factors in the Development of Reasoning in Two Problem Contexts
Wolff-Michael Roth, Indiana University
Marlene M. Milkent, University of Southern Mississippi

38 Problem Solving, Behaviors and Approaches of Successful and Unsuccessful Subjects During Interaction With a Genetics Computer Simulation
Patricia Simmons, University of Georgia

CONTRIBUTED PAPERS: Research on Instructional Computers and Laboratories

President:

Burton E. Voss
University of Michigan

Discussant:

Sarah L. Ulerick
Florida State University

Papers:

Inquiry Skills of Tenth Grade Biology Students in a Computer-Assisted Learning Setting

39 Reuven Lazarowitz, Israeli Institute of Technology-Technion
Judith Yaakoby, Israeli Institute of Technology-Technion

40 The Determinants of Grade 3 to 8 Students' Intentions to Engage in Laboratory and Non-Laboratory Science Learning Behavior
Brian Ray, Seattle Pacific University

Videodisc Based Macrocontexts for Instruction: An Experimental Study in Elementary School Science

41 Robert D. Sherwood, Vanderbilt University
Charles K. Kinzer, Vanderbilt University
Victoria J. Risko, Vanderbilt University
Nancy J. Vye, Vanderbilt University
John D. Bransford, Vanderbilt University

42 The Use of a Microcomputer-Based Classroom Simulation in the Preparation of Secondary Science Teachers
Burton E. Voss, The University of Michigan
Yu Jing Shyu, National Taiwan Normal University

10:00 - 11:30 A.M.

Room 2918

CONTRIBUTED PAPERS: Research on Teaching and Learning

Presider:

Ronald Bonnstetter
University of Nebraska

Discussant:

Robert K. James
Texas A&M University

Papers:

The Material Culture of Four Elementary Science Classrooms: Environment and Meaning

43 Elisabeth Charron, Montana State University

Effects of Self-Generated Examples on Elementary School Students' Retention of Science Concepts

44 Jeffrey Gorrell, Southeastern Louisiana University
Cynthia Tricou, Southeastern Louisiana University
Atonia Graham, Southeastern Louisiana University

45 The Effects of Intensive Instruction in Cue Attendance Upon Elementary Science Education Preservice Teachers' Interactive Inquiry Thought Processes:
A Qualitative Study

Emmett L. Wright, Kansas State University
Ron P. Hughes, Kansas State University
Don T. Powers, Kansas State University
David W. Brown, Kansas State University

A Comparison of Performance-Based Versus Pencil and Paper Measures of Science Process and Reasoning Skills as Influenced by Gender and Reading Abilities

Russell H. Yeany, University of Georgia

4/6 M. Annette LaRussa, University of Georgia

Teresa M. Kokoski, University of Georgia

Michael E. Hale, University of Georgia

SATURDAY, APRIL 1

96

1:00 - 2:00 P.M.

Ballroom

General Session

Presider:

Julia Clark
Texas A&M University

Presenter:

Martin Maehr, University of Michigan
It's Not Only What You Know, But Also What You *Want* To Know That Counts

SATURDAY, APRIL 1

2:15 - 3:45 P.M.

Cable

CONTRIBUTED PAPERS: Award-Winning Papers

President:

47 Patricia Heller
University of Minnesota

Discussant:

Victor Willson
Texas A&M University

Presenters to be announced by NARST Board of Directors

SATURDAY, APRIL 1

2:15 - 3:45 P.M.

Sutter 1/2

NARST-ERIC Annual Review of Research

Presider:

Lowell J. Bethel

University of Texas at Austin

Presenters:

Larry G. Enochs, Kansas State University

J. Steve Oliver, Kansas State University

Lawrence C. Sharmann, Kansas State University

John R. Staver, Kansas State University

Emmett L. Wright, Kansas State University

SATURDAY, APRIL 1

2:15 - 3:45 P.M.

Sutter 3

PRESENTATION OF NARST'S FIRST MONOGRAPHS

Presider:

Ron Good, Louisiana State University

Presenters:

A Theory of Instruction: Using the Learning Cycle to Teach Science Concepts and Thinking Skills

Michael Abraham, University of Oklahoma

Anton Lawson, Arizona State University

John Renner, University of Oklahoma

Honored Guest: Elizabeth Karplus

Learning Environment Research in Science Classrooms: Progress and Prospects

Barry Fraser, Curtin University of Technology

2:15 - 3:45 P.M.

North

SYMPOSIUM: A Unified Perspective

Presider:

Bill Baird
Auburn University

Discussant:

Frank E. Crawley
University of Texas

3¹ Symposium Focus and Summary — A Unified Perspective

Larry D. Yore, University of Victoria
Joan E. Russow, University of Victoria

3² Scientific Thinking and Problem-Solving — A Cognitive Science Perspective

Ron Good, Louisiana State University

3³ Thinking: A Function of Conceptual Knowledge and Cognitive Operations — A Cognitive Development Perspective

Anton Lawson, Arizona State University

2^d Self-regulating Your Thinking: Planning, Facilitating, and Monitoring — A Metacognitive Perspective

William G. Holliday, University of Maryland

3⁵ Thinking, Interacting and Inventing — An Interactive-Constructive Perspective

James A. Shymansky, University of Iowa

3⁶ Science Teacher Thinking About Student Thinking — An Instruction Perspective

Douglas A. Roberts, University of Calgary

Bonnie L. Shapiro, University of Calgary

3⁷ Assessment of Thinking in Science-An Evaluation Perspective

Michael Padilla, University of Georgia

SYMPOSIUM: Microcomputer-Based Learning

President:

Robert Rivers
Purdue University of - Calumet

Discussants:

Joseph S. Krajcik
University of Maryland at College Park

Learning with Microcomputer-Based Laboratories: Science Knowledge and Experimentation

38 Robert Tinker, TERC
John Zuman, TERC

Assessing Depth of Knowledge and Performance of Students Using Microcomputer-Based Laboratories on NAEP Thermodynamics Items

39 Nancy B. Songer, University of California, Berkeley
Marcia C. Linn, University of California, Berkeley

Heat Energy and Temperature Concepts of Adolescents, Naive Adults, and Experts: Implications for Curriculum Improvement

40 Eileen L. Lewis, University of California, Berkeley
Marcia C. Linn, University of California, Berkeley

Effects of Microcomputer-Based Laboratories on Student Understanding of Scientific Experimentation

41 John P. Zuman, TERC
Hyoshin Kim, TERC

Learning to Design Response Time Experiments With Microcomputer-Based Laboratories

42 John P. Zuman, TERC
Amy S. Weinberg, TERC

SATURDAY, APRIL 1

2:15 - 3:45 P.M.

Room 2918

Presider:

Shirley J. Magnusson
University of Michigan

Presenter:

Research Seminar with Martin Maehr, University of Michigan

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