



Improving science teaching
through research

64th Annual Meeting
The Abbey
Fontana, WI
April 7 - 10, 1991

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University of Georgia
Athens, GA 30602

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Glenn Markle (ex officio)
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Cincinnati, OH 45221

John Staver (ex officio)
Kansas State University
Manhattan, KS 66506

NARST OFFICERS 1990 - 1991

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John Staver
Kansas State University
Manhattan, KS 66506

EMERITUS MEMBERS

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in Science Teaching**

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Louisiana State University
Baton Rouge, LA 70803

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Cincinnati, OH 45221

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Edward Victor
William J. Walsh
Nathan S. Washton
Feltcher Watson
Allen D. Weaver

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 John M. Mason
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. Fraser
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 P. 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
1985 Ertle Thompson
1986 David P. Butts
1987 James P. Barufaldi
1988 Linda DeTure
1989 Patricia Blosser
1990 William Holliday
1991 Jane Butler Kahle
1992 Russell H. Yeany

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 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 Kansas State University (913-532-6294). Inquiries regarding Association matters should be directed to its Executive Secretary, Dr. John Staver, Center for Science Education, 244 Bluemont Hall, Kansas State University, Manhattan, KS 66506.

HOW NARST KEEPS ITS MEMBERS INFORMED

Ten 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 150 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).

SUNDAY, APRIL 7

10:00 A.M. - 5:00 P.M.	Executive Board Meeting	Movie Room
2:00 P.M. - 5:00 P.M.	Professional Development Seminar I	Nantucket North
2:00 P.M. - 5:00 P.M.	Professional Development Seminar II	Nantucket South
7:00 P.M. - 9:00 P.M.	General Session	Ballroom II & III
9:00 P.M.	Reception	Ballroom I & IA

MONDAY, APRIL 8

	Geneva I	Geneva II	Geneva III	St. Moritz	Aspen
7:30 - 8:30 A.M.	Financial Advisory Committee	Publications Advisory Committee	Policy Advisory Committee	Research Committee	Program Committee

MONDAY, APRIL 8

	Windjammers	Waterfront	Nantucket North	Nantucket South	Innsbruck	Ballroom I	Ballroom IA
8:30 - 10:00 A.M.	A1.1 Constructivist Workshop	B1.1 Symposium: Student Assessment	C1.1 Contributed Papers: Teacher Knowledge	D1.1 Contributed Papers: Cognitive Development	E1.1 Contributed Papers: Conceptual Change	F1.1 Contributed Papers: Curriculum Issues	G1.1 Panel: Reform in Science Education
10:00 - 10:30 A.M.	Coffee Break				Coffee Break		
10:30 - 12:00 P.M.	A1.2 Contributed Papers: Scientists and Science Education	B1.2 Symposium: Pedagogical Content Knowledge	C1.2 Paper Set: SEMNET in the Classroom	D1.2 Contributed Papers: Factors Influencing Learning	E1.2 Contributed Papers: Equity in Science Education	F1.2 Contributed Papers: Science Activities	G1.2 Panel: Curriculum Reform & The Research Agenda
12:00 - 2:00 P.M.	LUNCH (on your own)				LUNCH (on your own)		
2:00 - 3:30 P.M.	BALLROOM II & III General Session						

MONDAY, APRIL 8

	Windjammers	Waterfront	Nantucket North	Nantucket South	Innsbruck	Ballroom I	Ballroom IA
3:45 - 5:15 P.M.	A1.3 Contributed Papers: Knowledge of Prospective Teachers	B1.3 Symposium: Role of Technology	C1.3 Contributed Papers: Teachers and Teacher Preparation	D1.3 Contributed Papers: Scientific Reasoning & Thinking	E1.3 Contributed Papers: Science Textbooks	F1.3 Contributed Papers: Historical and Philosophical Perspectives	G1.3 Panel: Concept Mapping
5:15 - 7:30 P.M.	DINNER (on your own)			DINNER (on your own)			
7:30 - 9:00 P.M.	A1.4 Contributed Papers: Teacher Beliefs	B1.4 Symposium: New Directions for Research in Physics Education	C1.4 Discussion: Annual Review of Research	D1.4 Contributed Papers: Preservice Teachers	E1.4 Contributed Papers: Instructional Technology	F1.4 Discussion: Discussion with New Researchers	G1.4 Symposium: Project 2061

TUESDAY, APRIL 9

	Geneva I	Geneva II	Geneva III	St. Moritz	Aspen
7:30 - 8:30 A.M.	Election Advisory Committee	Distinguished Contribution Award Committee	JRST Awards Committee	NARST Awards Committee	International Issues Committee

TUESDAY, APRIL 9

	Windjammers	Waterfront	Nantucket North	Nantucket South	Innsbruck	Ballroom II	Ballroom III
8:30 - 10:00 A.M.	A2.1 Contributed Papers: Teacher Beliefs	B2.1 Symposium: Theoretical Bases for Research	C2.1 Paper Set: Theory of Planned Behavior	D2.1 Contributed Papers: Science Laboratory	E2.1 Contributed Papers: Student Assessment	F2.1 Contributed Papers: Classroom Discourse	G2.1 Panel: Telecommunication
10:00 - 10:30 A.M.	Coffee Break				Coffee Break		
10:30 - 12:00 P.M.	A2.2 Contributed Papers: Teacher Knowledge and Beliefs	B2.2 Symposium: Developing Science Curricula	C2.2 Contributed Papers: Problem Solving	D2.2 Contributed Papers: Biology Education	E2.2 Contributed Papers: Writing in Science	F2.2 Contributed Papers: Research Topics, Methods, and Priorities	G2.2 Contributed Papers: Comparative Studies
12:00 - 2:00 P.M.	Awards Luncheon and General Session Ballroom I & IA						

TUESDAY, APRIL 9

	Ballroom II Discussion Groups	Ballroom III Discussion Groups	Innsbruck Poster Sessions				Nantucket North Round Tables
2:00 - 3:15 P.M.	Group 1 Instructional Technology	Group 6 Equity	Session A Teacher Enhancement	Session E Methodology	Session H Conceptual Change	Session K Equity	Table 1 Assessing Laboratory Skills
	Group 2 Teacher Knowledge and Beliefs	Group 7 Improving Science Teaching	Session B Science Texts	Session F Science, Technology, and Society	Session I Concept Learning	Session L Assessment and Learning	Table 2 History & Philosophy
	Group 3 Teacher Education	Group 8 STS Curricula	Session C Teacher Education	Session G Instructional Technology	Session J Science Laboratory	Session M Process Skills	Table 3 Teacher Education
	Group 4 Problem Solving and Critical Thinking	Group 9 Participation and Achievement	Session D College Teaching				
	Group 5 Learning and Assessment	Group 10 College Science					

TUESDAY, APRIL 9

	Windjammers	Waterfront	Nantucket North	Nantucket South	Innsbruck	Ballroom II	Ballroom III
3:45 - 5:15 P.M.	A2.3 Contributed Papers: Content Knowledge	B2.3 Symposium: Implementing Activity-Based Learning	C2.3 Paper Set: Professional Development of Science Teachers	D2.3 Contributed Papers: Constructivism	E2.3 Contributed Papers: Instructional Technology	F2.3 Paper Set: Conceptual Change	G2.3 Symposium: Graduate Students Speak
5:15 - 7:30 P.M.	DINNER (on your own)				DINNER (on your own)		
7:30 - ? P.M.	NARST Interest Groups Ballrooms I & IA						

WEDNESDAY, APRIL 10

	Windjammers	Waterfront	Nantucket North	Nantucket South	Innsbruck	Ballroom II	Ballroom III
8:30 - 10:00 A.M.	A3.1 Contributed Papers: Teachers' Beliefs	B3.1 Symposium: Epistemological Theories	C3.1 Contributed Papers: Student Perception and Attitudes	D3.1 Contributed Papers: Instructional Technology	E3.1 Contributed Papers: Content Learning	F3.1 Contributed Papers: Problem Solving and Creative Thinking	G3.1 Contributed Papers: Research Methods
10:00 - 10:30 A.M.	Coffee Break				Coffee Break		
10:30 - 12:00 P.M.	A3.2 Contributed Papers: Conceptions of Prospective Teachers	B3.2 Symposium: NSTA/AAAS/ NARST Task Force	C3.2 Contributed Papers: Problem Solving and Critical Thinking	D3.2 Contributed Papers: Educating Prospective Science Teachers	E3.2 Contributed Papers: Science Learning	F3.2 Contributed Papers: Problem Solving and Creative Thinking	G3.2 Contributed Papers: Concept Knowledge Representation
12:00 - 1:00 P.M.	NARST Annual Business Meeting Ballroom I						

SUNDAY, APRIL 7

10:00 A.M.

EXECUTIVE BOARD MEETING

Movie Room

12:00 P.M.

EXECUTIVE BOARD LUNCH

Movie Room

SUNDAY, APRIL 7

2:00 - 5:00 P.M.

Professional Development Seminar I

Nantucket North

TOPIC: CONDUCTING CASE STUDIES IN SCIENCE EDUCATION

Presider:

Teresa M. Kokoski
University of Georgia

Presenter:

Hilda Borko
University of Maryland

SUNDAY, APRIL 7

2:00 - 5:00 P.M.

Professional Development Seminar II

Nantucket South

TOPIC: K-12 NEEDS ASSESSMENTS UTILIZING NSTA GUIDELINES

Presider:

John R. Wiggins
University of Georgia

Presenter:

Burton Voss
University of Michigan

SUNDAY, APRIL 7

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7:00 - 9:00 P.M.

General Session

Ballroom II & III

A CONSTRUCTIVIST APPROACH TO TEACHING AND CURRICULUM DEVELOPMENT IN SCIENCE

President:

Russell H. Yeany
University of Georgia

Speaker:

Rosalind Driver
University of Leeds

9:00 P.M.

Reception for New Members

Ballroom I & IA

All NARST members are invited to attend.

MONDAY, APRIL 8

7:30 - 8:30 A.M.

NARST Committee Meetings

Financial Advisory Committee
Robert Sherwood, Chair

Geneva I

Publications Advisory Committee
Kenneth G. Tobin, Chair

Geneva II

Policy Advisory Committee
William Holliday, Past-President

Geneva III

Research Committee
Frances Lawrenz, Research Coordinator

St. Moritz

Program Committee
Russell H. Yeany, President-Elect

Aspen

MONDAY, APRIL 8

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8:30 - 10:00 A.M.

Session A1.1

Windjammers

WORKSHOP: A CONSTRUCTIVIST APPROACH TO TEACHER EDUCATION

Presider:

John Wiggins

University of Georgia

Presenters:

Rosalind Driver, University of Leeds

Philip Scott, University of Leeds

(limited to 40 individuals)

MONDAY, APRIL 8

8:30 - 10:00 A.M.

Session B1.1

Waterfront

SYMPOSIUM TOPIC: STUDENT ASSESSMENT

Presenter:

Barry Fraser

Curtin University of Technology

Assessment and Investigation of Practical Performance in Science Classrooms

Barry J. Fraser, Curtin University of Technology

Rodney Doran, State University of New York

Linda DeTure, Rollins College

Goeff Giddings, Curtin University of Technology

8:30 - 10:00 A.M.

Session C1.1

Nantucket North

CONTRIBUTED PAPERS TOPIC: TEACHER KNOWLEDGE

Presider:

Mark Guy
University of Georgia

Discussant:

Ron Bonstetter
University of Nebraska

Papers:

Science Teaching and Teachers' Knowledge: Prospects for Reform of Elementary Classrooms

John Wallace, Curtin University of Technology
William Loudon, Western Australian Ministry of Education

Probing and Mapping Science Education Awareness for an Entire State

Michael H. McCoy, Louisiana State University
James H. Wandersee, Louisiana State University
Ron Good, Louisiana State University

Performance-Based Assessment of Biology Teachers: Promises and Pitfalls

Angelo Collins, Rutgers University

MONDAY, APRIL 8

8:30 - 10:00 A.M.

Session D1.1

Nantucket South

CONTRIBUTED PAPERS TOPIC: COGNITIVE DEVELOPMENT

Presider:

Cheryl Mason
San Diego State University

Discussant:

John R. Staver
Kansas State University

Papers:

Cognitive Development and Coding Orientation to Meanings - A Study of the Influence of the Social Context on the Students' Level of Cognitive Development

Dulce Peneda, University of Lisbon
Ana Morais, University of Lisbon

Hypothetico-deductive Reasoning and Maturation of the Prefrontal Cortex

Anton E. Lawson, Arizona State University
Al Gibbs, Charles Sturt University

Teaching Algorithmic Problem Solving or Conceptual Understanding: Role of Developmental Level, Mental Capacity, and Cognitive Style

Mansoor Niaz, Universidad de Oriente (Venezuela)
William R. Robinson, Purdue University

8:30 - 10:00 A.M.

Session E1.1

Innsbruck

CONTRIBUTED PAPERS TOPIC: CONCEPTUAL CHANGE

Presider:

Frank E. Crawley
University of Texas

Discussant:

Fred N. Finley
University of Minnesota

Papers:

Conceptual Change in Chemistry through Cooperative Problem Solving
Shanthi R. Krishnan, North Carolina State University

Conceptual Changes in Introductory Physics Students
Anita Roychoudhury, Miami University, Hamilton Campus
Dorothy L. Gabel, Indiana University

The Effects of a Conceptual Change Methods Course on Preservice Elementary Teachers' Conceptions about Science Content and Pedagogy
Rene T. Stofflett, University of Utah

MONDAY, APRIL 8

8:30 - 10:00 A.M.

Session F1.1

Ballroom 1

CONTRIBUTED PAPERS TOPIC: CURRICULUM ISSUES

Presider:

Gail M. Jones
University of North Carolina

Discussant:

Rodney L. Doran
SUNY at Buffalo

Papers:

National Science Curriculum and Professional Conflict
Alejandro Jose Gallard, Florida State University
James Gallagher, Michigan State University

Curriculum Development in Animal Science: A University, Zoo, and School District Collaboration
Karen K. Lind, University of Louisville

Combining Curriculum and Professional Development Can Make a Difference: Science Teaching in New Brunswick and Nova Scotia Grades 7, 8, and 9
Charles P. McFadden, University of New Brunswick

MONDAY, APRIL 8

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8:30 - 10:00 A.M.

Session G1.1

Ballroom IA

PANEL TOPIC: REFORM IN SCIENCE EDUCATION

Presenter:

Annette LaRussa
University of Georgia

Reform in Science Education: Assumptions and Alternative Views

Annette LaRussa, University of Georgia
Mary M. Atwater, University of Georgia
Carolyn Carter, The Ohio State University
Patricia Simmons, University of Georgia

MONDAY, APRIL 8

10:30 - 12:00 P.M.

SESSION A1.2

Windjammers

CONTRIBUTED PAPERS TOPIC: SCIENTISTS AND SCIENCE EDUCATION

Presider:

Hugh Baird
Brigham Young University

Discussant:

J. Preston Prather
University of Virginia

Papers:

Volunteers in the Science Classroom: A Study of the Benefits, Problems, and Issues

Teresa M. Kokoski, University of Georgia
Russell H. Yeany, University of Georgia

Scientists and Elementary Teachers: Partners in Science Teaching

Elizabeth A. Wier, University of Delaware
Stephanie Hinson, University of Delaware

An Analysis of the Effectiveness of an Interdisciplinary Poster-Newsletter in Improving Communication Between University Scientists and Science Educators

Catherine L. Cummins, Louisiana State University
James H. Wandersee, Louisiana State University

10:30 - 12:00 P.M.

Session B1.2

Waterfront

SYMPOSIUM TOPIC: PEDAGOGICAL CONTENT KNOWLEDGE

Presenter:

Joy Tingle
Nicholls State University

Pedagogical Content Knowledge: Definitions and Implications for Science Teacher Education and Research

Julie Gess-Newsome, Oregon State University

William S. Carlsen, Cornell University

Joseph S. Krajcik, University of Michigan

Norman G. Lederman, Oregon State University

MONDAY, APRIL 8

10:30-12:00 P.M.

Session C1.2

Nantucket North

PAPER SET TOPIC: SEMNET IN THE CLASSROOM

Presider:

Joseph Lipson
California State University, Chico

Discussant:

James H. Wandersee
Louisiana State University

Papers:

Microcomputer Based Knowledge Representation in Preservice Elementary Science Education

Michael Brody, Oregon State University

A Strategy for Assessing the Extent to Which Students Can Recall and Apply Scientific Knowledge

Fred Goldberg, San Diego State University

Nina Bach, San Diego State University

Automatic Conceptual Overviews of Semantic Networks

Joseph Faletti, Educational Testing Service, Princeton

Kathleen M. Fisher, San Diego State University

Automatic Overviews of Semantic Networks from Statistical and Graph Algorithms

Joseph Faletti, Educational Testing Service, Princeton

Lawrence T. Frase, Educational Testing Service

10:30 - 12:00 P.M.

Session D1.2

Nantucket South

CONTRIBUTED PAPERS TOPIC: FACTORS INFLUENCING LEARNING

President:

John E. Penick
University of Iowa

Discussant:

Michael D. Pilburn
Arizona State University

Papers:

Factors Which Influence Learning Ability During a Scientific Field Trip in a Natural Environment

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

College Science Courses and C-BASE Science, ACT Science, and GALT Scores: Predictors of Process Skills and Physical Science Misconceptions

Betty L. Bitner, Southwest Missouri State University

The Relationship Between Students' Approaches to Studying, Formal Reasoning Ability, Prior Knowledge, and Gender and Their Achievement in Chemistry

Saouma BouJaoude, Syracuse University
Frank Giuliano, Syracuse University

MONDAY, APRIL 8

10:30 - 12:00 P.M.

Session E1.2

Innsbruck

CONTRIBUTED PAPERS TOPIC: EQUITY IN SCIENCE EDUCATION

President:

Lawrence C. Scharmann
Kansas State University

Papers:

Gender Differences: What Should We Do in the Curriculum to Make a Difference?

Janet Carlson Powell, BSCS, Colorado Springs
M. Gail Shroyer, Kansas State University

Effect of Using Culturally-Relevant Science Curriculum Materials on Native American Elementary Students

Catherine E. Matthews, Boise State University
Walter S. Smith, University of Kansas

Factors Encouraging Participation of Women in Science and Technology

Elizabeth Hegarty-Hazel, University of Technology

Attitude Change and Gender - Equity in Science: Communicator Qualities that Enhance Persuasion

Thomas R. Koballa, Jr., University of Georgia

10:30-12:00 P.M.

Session F1.2

Ballroom I

CONTRIBUTED PAPERS TOPIC: SCIENCE ACTIVITIES

Presider:

Barbara Spector
University of South Florida

Discussant:

Michael Padilla
University of Georgia

Papers:

The Effects of the Sequence of Laboratory-Classroom Instruction and the Level of Reasoning on Student Achievement

Glenn Markle, University of Cincinnati
Jerry Ivins, Northwest School District, Cincinnati

Learning in Undergraduate Chemistry Laboratory as an Apprenticeship. Increasing Expert Laboratory Skills in First-Year Chemistry Students

Brian P. Coppola, University of Michigan

The Effects of Free Exploration from Hands-On Science Center Exhibits

Robert D. Boram, University of Oklahoma
Edmund A. Marek, University of Oklahoma

MONDAY, APRIL 8

10:30 - 12:00 P.M.

Session G1.2

Ballroom IA

PANEL TOPIC: CURRICULUM REFORM & THE RESEARCH AGENDA

Presenter:

Yvonne Meichtry
University of Cincinnati

Issues and Questions Related to Science Curriculum Reform: A Panel Discussion on Setting a Research Agenda

James A. Shymansky, University of Iowa

Bill G. Aldridge, Executive Director, NSTA

F. James Rutherford, Chief Education Officer, AAAS

Margaret Eisenhart, University of Colorado

William C. Kyle, Jr., Purdue University

Ray Hannapel, Program Director, NSF

Barbara Grohe, Superintendent, Iowa City Community School District

MONDAY, APRIL 8

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2:00 - 3:00 P.M.

General Session

Ballroom II & III

NATIONAL SCIENCE EDUCATION POLICY: WHAT IS IT? WHERE DOES IT ORIGINATE? HOW DO WE INFLUENCE IT?

Presider:

Russell H. Yeany
University of Georgia

Presenter:

Gary Allen
Triangle Coalition for Science and Technology Education

MONDAY, APRIL 8

3:45 - 5:15 P.M.

Session A1.3

Windjammers

CONTRIBUTED PAPERS TOPIC: KNOWLEDGE OF PROSPECTIVE TEACHERS

Presider:

Piyush Swami
University of Cincinnati

Discussant:

Angelo Collins
Rutgers University

Papers:

What Should Be Taught and Why: The Beliefs of Preservice Science Teachers

Fred Finley, University of Minnesota

Valerie Keeling Olness, University of Minnesota

What's a Teacher to Know?

Deborah J. Trumbull, Cornell University

Preservice Biology Teachers' Subject Matter Structures and Their Relationship to the Act of Teaching

Julie Gess-Newsome, Oregon State University

Norman G. Lederman, Oregon State University

MONDAY, APRIL 8

3:45 - 5:15 P.M.

Session B1.3

Waterfront

SYMPOSIUM TOPIC: ROLE OF TECHNOLOGY

Presider:

David Jackson
University of Georgia

Methodological Perspectives on the Role of Technology in Research on Student Use of Science Software

David Jackson, University of Georgia
Patricia Simmons, University of Georgia
Judith Kinnear, LaTrobe University
Carl Berger, University of Michigan
Charles Dershimer, University of Michigan
Mary Nakhleh, Purdue University

MONDAY, APRIL 8

3:45 - 5:15 P.M.

Session C1.3

Nantucket North

CONTRIBUTED PAPERS TOPIC: TEACHERS AND TEACHER PREPARATION

Presider:

Deborah Tippins
University of Georgia

Discussant:

Thaddeus W. Fowler
University of Cincinnati

Papers:

An Assessment of Factors Related to Attrition and Retention of Science and Mathematics Teachers
Emmett L. Wright, Kansas State University

Research Interests: Comparison of Preservice and Inservice Elementary Teachers
Betty L. Bitner, Southwest Missouri State University

Preparation of Science and Mathematics Teachers for the Twenty-First Century
Sarah B. Berenson, North Carolina State University

3:45 - 5:15 P.M.

Session D1.3

Nantucket South

CONTRIBUTED PAPERS TOPIC: SCIENTIFIC REASONING & THINKING

Presider:

Linda R. DeTure
Rollins College

Discussant:

Ann Howe
University of Maryland

Papers:

Could Science Reasoning be the Basis of All Cognition?

Philip S. Adey, Kings College, London

Understanding a Basic Biological Process: Expert and Novice Models of Meiosis

Ann C. Hildebrand, University of California, Berkeley

A Study of the Effects of Prediction Activities on Instructional Outcomes in High School Genetics

Anne S. Sinclair, Louisiana State University

Ron G. Good, Louisiana State University

CONTRIBUTED PAPERS TOPIC: SCIENCE TEXTBOOKS

Presenter:

James P. Barufaldi
University of Texas

Discussant:

Robert H. Evans
Wake Forest University

Papers:

Analysis of the Presentation of the Mole Concept in Chemistry Textbooks

John R. Staver, Kansas State University
Andrew T. Lumpe, Kansas State University

Do Middle School Life Science Textbooks Provide a Balance of Coverage of Scientific Literacy Themes?

Eugene L. Chiappetta, University of Houston
Godrej H. Sethna, Houston Museum of Natural Science
David A. Fillman, Galena Park Independent School District, Texas

How Well Do the Most Used Science Textbooks in Secondary Schools Cover the Interrelationship of Science, Technology, and Society?

Betty Chiang-Soong, National Taiwan Normal University
Robert E. Yager, University of Iowa

3:45 - 5:15 P.M.

Session F1.3

Ballroom I

CONTRIBUTED PAPERS TOPIC: HISTORICAL AND PHILOSOPHICAL PERSPECTIVES

Presider:

Ava Pugh
Northeast Louisiana

Papers:

The Scientist as Cracker-Barrel Philosopher: Implications for the Concept of Scientific Literacy
David Jackson, University of Georgia

Albert Einstein: A Case Study of His Unique Thinking Style
Deborah J. Tippins, University of Georgia

Home Schooling, Science Achievement, and Parents' Beliefs About God and the Origin of Species and Life
Brian D. Ray, National Home Education Research Institute, Washington

The Scientific Theory Profile: A Philosophy of Science Model for Science Teachers
Cathleen Loving, California State University, Fresno

MONDAY, APRIL 8

3:45 - 5:15 P.M.

Session G1.3

Ballroom IA

PANEL TOPIC: CONCEPT MAPPING

Presider:

James H. Wandersee
Louisiana State University

Papers:

The Use of Concept Mapping in Science Education Research: Overview and Issues

Jim Wandersee, Louisiana State University

Joseph D. Novak, Cornell University

Kathleen Fisher, San Diego State University

Joel J. Mintzes, University of North Carolina at Wilmington

Joseph Krajcik & Mary Starr, University of Michigan

7:30 - 9:00 P.M.

Session A1.4

Windjammers

CONTRIBUTED PAPERS TOPIC: TEACHER BELIEFS

Presider:

Daryl Adams
Mankato State University

Discussant:

Thomas R. Lord
Indiana University of Pennsylvania

Papers:

What Counts as Success? Perspectives from Practice and Research
Nancy W. Brickhouse, University of Delaware

The Natural World as Understood by Selected College Students: A World View Methodological Exploration
William W. Cobern, Arizona State University-West

Aspects of Cognitive Apprenticeship in Science Teaching
Wolff-Michael Roth, Appleby College

MONDAY, APRIL 8

7:30 - 9:00 P.M.

Session B1.4

Waterfront

SYMPOSIUM TOPIC: NEW DIRECTIONS FOR RESEARCH IN PHYSICS EDUCATION

Presider:

Ronald G. Good
Louisiana State University

New Directions for Research in Physics Education

Fred Goldberg, San Diego State University
Peter W. Hewson, University of Wisconsin
Mariana G.A.B. Hewson, University of Wisconsin
Jim Minstrell, Mercer Island Sr. High School, Washington
John Clement, University of Massachusetts
David Brown, University of Illinois

MONDAY, APRIL 8

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7:30 - 9:00 P.M.

Session C1.4

Nantucket North

DISCUSSION TOPIC: ANNUAL REVIEW OF RESEARCH

Presenter:

Dorothy Gabel
Indiana University

Discussants:

Ronald D. Anderson
University of Colorado

Victor L. Willson
Texas A & M University

Presenter:

Annual Review of Research
Dale Baker, Arizona State University

MONDAY, APRIL 8

7:30 - 9:00 P.M.

Session D1.4

Nantucket South

CONTRIBUTED PAPERS TOPIC: PRESERVICE TEACHERS

Presider:

Betty L. Bitner
Southwest Missouri State

Discussant:

Emmett L. Wright
Kansas State University

Papers:

A Qualitative Analysis of Preservice Elementary Teachers' Conceptions of Heat Transfer and Temperature

Peggy J. Tilgner, Wartburg College

Donald W. McCurdy, University of Nebraska

The Implementation of Equitable Teaching Strategies by Biology Student Teachers

Kate Scantlebury, University of Maine

Jane Butler Kahle, Miami University

Coping With Constraints of Teaching Elementary Science: A Case Study of a Science Enthusiast Student Teacher

Sandra K. Abell, Purdue University

Marie Roth, Tippecanoe County School Corporation, Indiana

7:30 - 9:00 P.M.

Session E1.4

Innsbruck

CONTRIBUTED PAPERS TOPIC: INSTRUCTIONAL TECHNOLOGY

President:

John Clementson
University of Nebraska, Lincoln

Discussant:

Michael E. Hale
University of Georgia

Papers:

An Analysis of Metacognitive Skills Utilized by Students During Computer Simulation Activities

Willis J. Horak, University of Arizona

Developments of Computer Software for Diagnosis and Remediation of Alternative Dynamics Conceptions: A Problem in Instructional Design as well as in Science Conceptual Change

Herman G. Weller, Texas Tech University

The Development and Preliminary Evaluation of Anchored Instruction Environments for Developing Mathematical and Scientific Thinking

Robert D. Sherwood, Peabody College of Vanderbilt University

Cognition and Technology Group, Vanderbilt University

MONDAY, APRIL 8

7:30 - 9:00 P.M.

Session F1.4

Ballroom 1

DISCUSSION TOPIC: DISCUSSION WITH NEW RESEARCHERS

Presiders:

William G. Holliday
University of Maryland

Ken Tobin
Florida State University

Francis Lawrenz
Florida State University

Special Session: Just for graduate students and new researchers.

MONDAY, APRIL 8

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7:30 - 9:00 P.M.

Session G1.4

Ballroom 1A

SYMPOSIUM TOPIC: PROJECT 2061

Presider:

Andrew Ahlgren

Project 2061

The AAA's Project 2061, currently in Phase II, is undergoing the process of designing alternative models of K-12 curriculum. In this symposium Project 2061 participants and researchers will discuss issues related to Phase II. Several issues to be addressed include: (a) effective use of current research; (b) the possibility of generalizing from content areas already investigated to illuminate other content areas; and (c) directions for future research.

TUESDAY, APRIL 9

7:30 - 8:30 A.M.

NARST Committee Meetings

Election Committee William Holliday, Past President	Geneva I
Distinguished Contribution Award Committee Donald W. McCurdy, Chair	Geneva II
JRST Awards Committee Lowell J. Bethel, chair	Geneva III
NARST Awards Committee Thomas R. Koballa, Chair	St. Moritz
International Issues Committee Pamela Fraser-Abder, Chair	Aspen

8:30 - 10:00 A.M.

Session A2.1

Windjammers

CONTRIBUTED PAPERS TOPIC: TEACHER BELIEFS

Presider:

Robert Yager
University of Iowa

Discussant:

Uri Zoller
Haifa University - ORANIM

Papers:

Making Sense of Science and Science Teaching: The Re-Construction of Knowledge Among Prospective Elementary Teachers

Thomas M. Dana, Florida State University

Sharon Parsons, Florida State University

From Science Student to Science Teacher: Prospective Teachers Making Sense of Science Teaching

Anthony W. Lorschach, Florida State University

The Influence of Preservice Secondary Science Teachers' Beliefs about Science and Pedagogy on their Planning and Teaching

Hsiao-lin Tuan, National Changhua University of Education, Taiwan

TUESDAY, APRIL 9

8:30 - 10:00 A.M.

Session B2.1

Waterfront

SYMPOSIUM TOPIC: THEORETICAL BASES FOR RESEARCH

Presider:

John Wiggins

University of Georgia

Theoretical Bases for Science Education Research

Ronald Good, Louisiana State University

William Cobern, Arizona State University

Richard Duschl, University of Pittsburgh

Ken Tobin, Florida State University

8:30 - 10:00 A.M.

Session C2.1

Nantucket North

PAPER SET TOPIC: THEORY OF PLANNED BEHAVIOR

Presider:

Joseph P. Riley
University of Georgia

Papers:

Intentions of Grade 5-8 Science Teachers to Use Science Investigations: Application of the Theory of Planned Behavior

Brenda K. Johnson, Western Michigan University
Frank Crawley, University of Texas at Austin

Hispanic Students' Attitudes Toward Enrolling in High School Chemistry: A Study of Planned Behavior and Belief-Based Change

Frank E. Crawley, University of Texas at Austin
Thomas R. Koballa, University of Georgia

The Effect of Two Videotaped Persuasive Messages on 7th Grade Science Students' Intentions to Perform an AIDS-Related Laboratory Behavior

Melissa A. Warden, University of Texas at Austin
Thomas R. Koballa, Jr., University of Georgia

Predicting and Understanding Korean High School Students' Science Track Choice: Testing the Theory of Reasoned Action by Structural Equation Modeling

Jeon-ok Myeong, Chungnam National University, Korea
Frank E. Crawley, University of Texas at Austin

TUESDAY, APRIL 9

8:30 - 10:00 A.M.

Session C2.1 (continued)

Nantucket North

PAPER SET TOPIC: THEORY OF PLANNED BEHAVIOR

Student and Parental Message Effects on Urban Hispanic Students' Intention to Enroll in High School Chemistry

Carolyn B. Black, University of Texas at Austin

Frank E. Crawley, University of Texas at Austin

CONTRIBUTED PAPERS TOPIC: SCIENCE LABORATORY

Presider:

Mike U. Smith
Mercer University

Discussant:

Barry J. Fraser
Curtin University

Papers:

What happens during high school chemistry laboratory sessions? A descriptive case-study of the behaviors exhibited by three teachers and their students.

Carmine De Carlo, Slippery Rock University
Peter A. Rubba, Pennsylvania State University

Effects of Contextual Cues on Student Performance in the Laboratory

John T. Wilson, University of Iowa
Mark S. Stensvold, Indiana University at Kokomo

A Content Analysis of Secondary Biology Laboratory Activities

Andrew T. Lumpe, Kansas State University
Lawrence C. Scharmann, Kansas State University

TUESDAY, APRIL 9

8:30 - 10:00 A.M.

Session E2.1

Innsbruck

CONTRIBUTED PAPERS TOPIC: STUDENT ASSESSMENT

Presider:

Paul J. Germann
University of Missouri

Papers:

The Relationship Between Gender Differences and Figurally Presented Items in a Third Grade C-R Science Test in Costa Rica

Juan M. Esquivel-Alfaro, Universidad de Costa Rica

Sofia Maria Diaz-Solis, Universidad de Costa Rica

The Development and Testing of Laboratory Performance Tasks for the Assessment of Achievement in High School Physics

Joan Boorman, SUNY at Buffalo

Construct Validity of Multiple-Choice and Performance-Based Assessments of Basic Science Process Skills: A Multitrait-Multimethod Analysis

James E. Marshall, California State University, Fresno

Positive and Negative Multiple Choice Items: How Different are They?

Pinchas Tamir, Hebrew University of Jerusalem

8:30 - 10:00 A.M.

Session F2.1

Ballroom II

CONTRIBUTED PAPERS TOPIC: CLASSROOM DISCOURSE

Presider:

Essie C. Beck
Consultant L.A. Science Teachers

Discussant:

Kenneth G. Tobin
Florida State University

Papers:

What Does Discourse Mean in a Science Classroom?

Alejandro J. Gallard, Florida State University
Pamela Carroll, Florida State University

Studying the Physics Teachers' Discourse During Laboratory Work

Armando Contreras, Universidad de Los Andes. Nucleo Universitario "Rafael Rangel"

"That's Kinda Interesting, But It's Not Really Chemistry:" Classroom Discourse and the Domain of Science

William S. Carlsen, Cornell University
Timothy Kirkpatrick, Dryden Central School District, New York

TUESDAY, APRIL 9

8:30 - 10:00 A.M.

Session G2.1

Ballroom III

PANEL TOPIC: TELECOMMUNICATION

Presider:

William S. LaShier, Jr.
University of Kansas

Telecommunication in the ShareNet Project

William S. Lashier, University of Kansas

Ronald Aust, University of Kansas

Mike Nelson, University of Kansas

10:30 - 12:00 P.M.

Session A2.2

Windjammers

CONTRIBUTED PAPERS TOPIC: TEACHER KNOWLEDGE AND BELIEFS

Presider:

Virginia Epps
University of Kansas

Discussant:

William S. LaShier, Jr.
University of Kansas

Papers:

Relationships Among Opinions and Attitudes Toward Science and Teaching and Process Skills of Life Science Teachers

Mary M. Atwater, University of Georgia

Patricia Simmons, University of Georgia

David Butts, University of Georgia

Wyatt Anderson, University of Georgia

Rosalina Hasrriston, Southern Mississippi University

Environmental Content, Belief, and Affective Conceptual Structures as Part of an Overall Conceptual Framework

Ann Novak, University of Maryland

Judith Torney-Purta, University of Maryland

TUESDAY, APRIL 9

10:30 - 12:00 P.M.

Session A2.2 (continued)

Windjammers

CONTRIBUTED PAPERS TOPIC: TEACHER KNOWLEDGE AND BELIEFS:

Students' Versus Their Teachers Beliefs and Positions on Science/Technology/Society (S/T/S)-Oriented Issues

Uri Zoller, Hafia University - Oranim

Stuart Donn, University of British Columbia

Reginald Wild, University of British Columbia

TUESDAY, APRIL 9

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10:30 - 12:00 P.M.

Session B2.2

Waterfront

SYMPOSIUM TOPIC: DEVELOPING SCIENCE CURRICULA

Presider:

Carole P. Mitchener

University of Missouri, St. Louis

The “Coming Duty of Science Teaching”: The STS Response to Schwab

Carole P. Mitchener, DePaul University

Peter Pereira, DePaul University

Glen Aikenhead, University of Saskatchewan

Douglas A. Roberts, Ontario Institute for Studies in Education

TUESDAY, APRIL 9

10:30 - 12:00 P.M.

Session C2.2

Nantucket North

CONTRIBUTED PAPERS TOPIC: PROBLEM SOLVING

President:

Larry G. Enochs
Kansas State University

Papers:

Recognition and Realization Rules in Learning School Science - A Sociological Approach to Problem Solving

Ana Morais, University of Lisbon
Fernanda Fontinhas, University of Lisbon
Isabel Neves, University of Lisbon

Students' Difficulties with Subscripts in Chemical Formulas

David P. Maloney, Indiana University-Purdue University at Fort Wayne
Arthur W. Friedel, Indiana University-Purdue University at Fort Wayne

Effect of Information Format on Students' Problem Solving Strategies

Arthur W. Friedel, Indiana University-Purdue University at Fort Wayne
David P. Maloney, Indiana University-Purdue University at Fort Wayne

TUESDAY, APRIL 9

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10:30 - 12:00 P.M.

Session C2.2 (continued)

Nantucket North

CONTRIBUTED PAPERS TOPIC: PROBLEM SOLVING

Group Versus Individual Problem Solving in a Large Introductory Physics Course

Patricia Heller, University of Minnesota

Ronald Keith, University of Minnesota

Scott Anderson, University of Minnesota

TUESDAY, APRIL 9

10:30 - 12:00 P.M.

Session D2.2

Nantucket South

CONTRIBUTED PAPERS TOPIC: BIOLOGY EDUCATION

Presider:

Patricia Simmons
University of Georgia

Discussant:

James D. Ellis
B.S.C.S.

Papers:

How to Make the Learning of Photosynthesis More Relevant
Yehudit Eisen, Tel-Aviv University

Teaching Evolution: Understanding, Concerns, and Instructional Approaches
Lawrence C. Scharmann, Kansas State University
William M. Harris, Kansas State University

Elementary Textbooks Versus the Child: Conflicting Perceptions in Biology
Delena I. Tull, University of Central Arkansas

10:30 - 12:00 A.M.

Session E2.2

Innsbruck

CONTRIBUTED PAPERS TOPIC: WRITING IN SCIENCE

Presider:

O. Roger Anderson
Columbia University

Discussant:

William C. Kyle, Jr.
Purdue University

Papers:

Science Teachers' Perceptions about Writing in Science: A Report of Phase II -- Interview
Karen Sullenger, University of New Brunswick

Research on Reading and Writing in Science Teaching: NSTA and NARST Working Together
William G. Holliday, University of Maryland
Laura M. Barden, University of Maryland

Investigating Science Concepts Through Writing Activities
Kathleen J. Roth, Michigan State University
Cheryl L. Rosaen, Michigan State University

TUESDAY, APRIL 9

10:30 - 12:00 P.M.

Session F2.2

Ballroom II

CONTRIBUTED PAPERS TOPIC: RESEARCH TOPICS, METHODS, AND PRIORITIES

Presider:

Michael R. Abraham
University of Oklahoma

Discussant:

Richard A. Duschl
University of Pittsburgh

Papers:

Randomness, Replication and Research Design in Five Years of the *Journal of Research in Science Teaching*

Phillip Horton, Florida Institute of Technology
Andrew McConney, Florida Institute of Technology
Kevin Barry, Florida Institute of Technology
Amanda Woods, Florida Institute of Technology
Greg Challenger, Florida Institute of Technology
Abla Abu-Nabaa, Florida Institute of Technology
Barbara Doyle, Florida Institute of Technology

Speculative Philosophical Analysis of Priorities for Research in Science Education

J. Preston Prather, University of Virginia

Twenty-Five Years in *JRST*: Research Topics, Methods and Issues

Ann C. Howe, University of Maryland
Laura Barden, University of Maryland

10:30 - 12:00 P.M.

Session G2.2

Ballroom III

CONTRIBUTED PAPERS TOPIC: COMPARATIVE STUDIES

Presider:

James A. Shymansky
University of Iowa

Discussant:

Pamela F. Abder
New York University

Papers:

A Case Study of Primary Science Teaching in Malaysia

Ahmad Nurulazam, Md. Zain, University of Science, Malaysia

Descriptive Characteristics of Science/Mathematics Educators and Factors that Discriminate Them from Scientists/Mathematicians and Other Educators using Data from the Third Follow-up of High School and Beyond

Casey R. Lu, University of Michigan

Science Teachers: A Comparative Perspective

Maureen H. O'Rafferty, SUNY at Buffalo

Rodney L. Doran, SUNY at Buffalo

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group I

Ballroom II

DISCUSSION GROUP TOPIC: INSTRUCTIONAL TECHNOLOGY

Discussion Group Leader:

Robert D. Sherwood
Peabody College / Vanderbilt University

Papers:

Training Student-Teachers in the Use of Computers in Science Classrooms

Jehuda Huppert, University of Haifa
Reuven Lazarowitz, I.I.T. Technion

Learning in the Middle School Earth Science Classroom: Students Use Intelligent Laserdiscs to Conceptually Integrate New Knowledge

Patricia K. Freitag, Boston University - SED
Gerald Abegg, Boston University

The Development and Partial Validation of the Microcomputer Utilization in Teaching Efficacy Beliefs Instrument

Larry Enochs, Kansas State University
Iris M. Riggs, California State University-San Bernardino
James D. Ellis, BSCS

Reflective Teaching and Conceptual Change in an Interdisciplinary Methods Course

Warren C. Tomkiewicz, Plymouth State College

TUESDAY, APRIL 9

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2:00 - 3:15 P.M.

Discussion Group I (continued)

Ballroom II

DISCUSSION GROUP TOPIC: INSTRUCTIONAL TECHNOLOGY

Changes in Thinking as a Chemistry Student Becomes a Chemistry Teacher

Ruthann Schulke, Pinckney High School

Thomas Yocum, Pinckney High School

James J. Gallagher, Michigan State University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group 2

Ballroom II

DISCUSSION GROUP TOPIC: TEACHER KNOWLEDGE AND BELIEFS

Discussion Group Leader:

Kenneth G. Tobin
Florida State University

Papers:

A Qualitative Study of Preservice Elementary Teachers' Understanding of Physics Concepts

Lois M. Campbell, Purdue University

A Qualitative Study of the Beliefs and Professional Backgrounds of Secondary Level Science Teachers in a Public School and a Protestant Christian School

Fred H. Groves, Northeast Louisiana University

A Study of Changes in Middle School Teachers' Understanding of Selected Ideas in Science as a Function of an Inservice Program Focusing on Student Preconceptions

James A. Shymansky, University of Iowa

Obed Norman, University of Iowa

George Woodworth, University of Iowa

John Dunkhase, University of Iowa

Chin Tang Liu, University of Iowa

Charles C. Mathews, Maharishi International University, Iowa

2:00 - 3:15 P.M.

Discussion Group 3

Ballroom II

DISCUSSION GROUP TOPIC: TEACHER EDUCATION

Discussion Group Leader:

Ron Bonnsetter
University of Nebraska

Papers:

The University - Museum Connection: A Model Elementary Teacher Training Partnership

Dawn M. Pickard, Oakland University
Janet Johnson, Cranbrook Institute of Science
Rene Givens, Cranbrook Institute of Science
David Housel, Oakland Intermediate Schools

The Perception of Science Skills by College Methods Instructors, Experienced, and Inexperienced Secondary Chemistry Teachers for Effective Secondary Chemistry Instruction

Paul Tiskus, Indiana University
Dorothy Gabel, Indiana University

Cube Activities Intervention to Improve Spatial Ability Among Elementary Education Majors

Jon Scott Stancil, East Carolina University
Claudia T. Melear, East Carolina University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group 3 (continued)

Ballroom II

DISCUSSION GROUP TOPIC: TEACHER EDUCATION

A Way to Run an Effective Training Model for Inservice Science Teachers of Elementary Schools In Taiwan

Chao-Ti Hsiung, Taiwan Provincial Taipei Teachers College

Ching-Tan Chen, Taiwan Provincial Taipei Teachers College

Tien-Yin Lee, Taiwan Provincial Taipei Teachers College

Yu-Jiing Shyu, Taiwan Provincial Taipei Teachers College

2:00 - 3:15 P.M.

Discussion Group 4

Ballroom II

DISCUSSION GROUP TOPIC: PROBLEM SOLVING AND CRITICAL THINKING

Discussion Group Leader:

Patricia Simmons
University of Georgia

Papers:

General Education Biology Courses, Student Characteristics, and Critical Thinking

Imelda K. Cajoles, Southeast Missouri State University
Alan R. P. Journet, Southeast Missouri State University

Representation and Feedback in the Formation of a Physical Science Concept

Patricia Iuele, Rutgers University

Diagnosing Procedural Skills in Classical Genetics Problem Solving

Michael Ulon Smith, Mercer University School of Medicine
Wyllis Bandler, Florida State University
Bienvenido Jose A. Juliano, Jr., Florida State University

The Influence of Language in Middle School Problem Solving

Stanley J. Sobolewski, Horseheads Middle School, New York

Relationships Among Problem Solving, Student Interaction, and Thinking Skills

Dan Shepardson, Purdue University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group 5

Ballroom II

DISCUSSION GROUP TOPIC: LEARNING AND ASSESSMENT

Discussion Group Leader:

Victor L. Willson

Texas A&M University

Papers:

Mathematics - Science Integration Project: A Collaborative Rural School Effort

Peter M. Mecca, SUNY College at Oneonta

The Effect of Variation in the Expansion Phase of the Learning Cycle on Student Concept Organization and Application

Laura N. Rogers, University of Oklahoma

Susan L. Westbrook, Norman Public Schools, Oklahoma

A Path Analytical Model of Variables that Influence Science and Chemistry Teaching Self-Efficacy and Outcome Expectancy in Middle School Science Teachers

Mary L. Rubeck, Friends University

Larry G. Enochs, Kansas State University

An Investigation of Cognitive Development, Attitudes in the Sciences and Achievement on Missouri Core Competencies

Dee French, Charleston R-1 Schools, Missouri

Alan Journet, Southeast Missouri State University

2:00 - 3:15 P.M.

Discussion Group 6

Ballroom III

DISCUSSION GROUP TOPIC: EQUITY

Discussion Group Leader:

Mary M. Atwater
University of Georgia

Papers:

Children and Stereotypes: Modifying the Image of Scientist
Dawn M. Pickard, Oakland University

The Effect of Gender, Ethnicity, Socioeconomic Status and Study Habits on Attitude and Achievement in a Sample of At-Risk Urban Secondary Science Students
Pamela Fraser-Abder, New York University
Andrew Apicos, New York University

The Importance of Planning in Achieving an Equitable Science Classroom
Kate Scantlebury, University of Maine
Jane Butler Kahle, Miami University

Enhancing Science Achievement and Attitudes in Limited English Proficient Students
Steven J. Rakow, University of Houston, Clear Lake
Andrea B. Bermudez, University of Houston, Clear Lake

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group 7

Ballroom III

DISCUSSION GROUP TOPIC: IMPROVING SCIENCE TEACHING

Discussion Group Leader:

Eugene L. Chiappetta
University of Houston

Papers:

A Qualitative Study of the Interactions of Elementary Students and Teachers With FOSS - Full Option Science System
John J. Clementson, University of Nebraska

Improving Science Teaching in Elementary Schools: A Research Program Based Upon Cognitive Science and Instructional Technology
Michael R. Vitale, East Carolina University
Nancy Romance, Florida Atlantic University

Gender and Racial Interactive Differences in Unstructured Group Work
Catherine R. Conwell, University of North Carolina
Sandra Griffin, University of North Carolina
Bob Algozzine, University of North Carolina

The Impact of Transition from Junior Highs to Middle Schools on Science Programs
M. Gail Jones, University of North Carolina at Chapel Hill

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group 8

Ballroom III

DISCUSSION GROUP TOPIC: STS CURRICULA

Discussion Group Leader:

Peter Rubba
Pennsylvania State University

Papers:

The Iowa Chautauqua Model

Robert E. Yager, University of Iowa

Changes in Teacher Attitude and Behavior

Susan Blunck, University of Iowa

Changes in Student Learning

Srini Iskander, University of Iowa

Districtwide Shifts to STS: The NSTA SS&C Project

John E. Penick, University of Iowa

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Discussion Group 9

Ballroom III

DISCUSSION GROUP TOPIC: PARTICIPATION AND ACHIEVEMENT

Discussion Group Leader:

Patricia E. Blosser

Ohio State University

Papers:

Participation in School Science: A Synthesis of Recent Research

J. Steve Oliver, University of Georgia

Declines in Student Achievement in Science: Implications for Public Education

Robert P. Hogan, Martin Marietta Electronics & Missiles Group

2:00 - 3:15 P.M.

Discussion Group 10

Ballroom III

DISCUSSION GROUP TOPIC: COLLEGE SCIENCE

Discussion Group Leader:

Lowell J. Bethel
University of Texas at Austin

Papers:

Format for Successful Biology Laboratories: A Research-Based Model

Lon Richardson, Mankato State University
D. Daryl Adams, Mankato State University

The Nature of a Biotechnology Curriculum as Perceived by Biotechnology Majors, Professors, and Industry

Julie L. Higgs, Mankato State University
D. Daryl Adams, Mankato State University

Format or ForMAZE? What Naturalistic Research Reveals About How College Students Conduct and Compose Original Research

Virginia Anderson, Townson State University
Barbara F. Walvoord, Loyola College

The Influence of Personal Factors Including Racial Classification on College General Education Science Achievement: A Multiple Regression Study Model

Gerry D. Haukoos, Illinois State University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Round Table 1

Nantucket North

ROUND TABLE TOPIC: ASSESSING LABORATORY SKILLS

Assessment of Science Lab Skills at the High School Level

Rodney L. Doran, University at Buffalo

Joan Boorman, University at Buffalo

Fred Chan, University at Buffalo

Maureen O'Rafferty, University at Buffalo

2:00 - 3:15 P.M.

Round Table 2

Nantucket North

ROUND TABLE TOPIC: HISTORY & PHILOSOPHY

International History, Philosophy and Science Teaching Group - A Discussion

Richard A. Duschl, University of Pittsburgh

Michael Matthews, University of New South Wales

George Hills, Queen's University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Round Table 3

Nantucket North

ROUND TABLE TOPIC: TEACHER EDUCATION

Teaching Methods Courses in Science Education

Derrick R. Lavoie, Montana State University

Elisabeth Charron, Montana State University

2:00 - 3:15 P.M.

Poster Session A

Innsbruck

POSTER SESSION TOPIC: TEACHER ENHANCEMENT

Age Distribution of Public Secondary Science Teachers: Possible Relationships with Science Discipline, School Size, and Poverty Level Variables

M. Virginia Epps, University of Kansas

Knowledge Developed by a High School Teacher Engaged in Physics Research

Joe Garofalo, University of Virginia

J. Preston Prather, University of Virginia

A Survey of the Differences Between Science Fair Teacher - Sponsors and Nonsponsors at Middle & High School Levels

John R. Wiggins, University of Georgia

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Poster Session B

Innsbruck

POSTER SESSION TOPIC: SCIENCE TEXTS

Evolution of Atomic Theory: Contrasting Representation in Instructional Text with Knowledge in Scientific Field

Barbara McGoldrick, Rutgers University

POSTER SESSION TOPIC: TEACHER EDUCATION

Risk-Taking and Leadership Roles for Teachers in Implementing Curriculum Changes

Charles R. Ault, Jr., Lewis & Clark College

Phyllis Campbell Ault, Lewis & Clark College

The Effects of Hands-on Teaching Strategies on Preservice Elementary Teachers' Conceptions about Earth-Sun-Moon Relationships

Priscilla L. Callison, Kansas State University

Emmett L. Wright, Kansas State University

A Case Study of an Elementary Science Program

Pat Phillips, University of Georgia

The Effects of a Lead Science Teacher Training Program on Elementary Teachers' Science Self-Efficacy

Catherine G. Yeotis, Wichita State University

Linda Bakken, Wichita State University

The Effect of an NSF Summer Institute on Middle School Science Teachers' Perception of Their Level of Science Knowledge and Knowledge and Use of Various Teaching Strategies and Techniques

Cheryl L. Mason, San Diego State University

Thomas J. Greenbowe, Iowa State University

Barbara W. Saigo, University of Northern Iowa

POSTER SESSION TOPIC: TEACHER EDUCATION

Increasing Learning Using Questions Embedded in Science Videotapes

Laura M. Barden, University of Maryland

William G. Holliday, University of Maryland

Teaching Strategies Utilized After Participating in an Inservice Elementary Science Program

Lloyd H. Barrow, Missouri University

Yindee Sawanakunanont, Teacher's College Sangkhla, Thailand

Creating Questions in Secondary Science Education

Patricia Kerr, University of North Dakota

Knowledge Structures of Preservice Teachers Regarding Both Concepts of Heat and Temperature and Pedagogical Content Knowledge of Heat and Temperature

Mary L. Starr, The University of Michigan

A Comparison of Lesson Planning Decision Patterns of Novice and Experienced Biology Teachers

Mark A. Templin, University of Michigan

Joseph S. Krajcik, University of Michigan

Preservice Teachers' Perceptions and Concerns About Classroom Management and Discipline: A Qualitative Investigation

Mark Latz, Oregon State University

2:00 - 3:15 P.M.

Poster Session D

Innsbruck

POSTER SESSION TOPIC: COLLEGE TEACHING

Student Background and Achievement in University Freshman Biology Courses

Melanie C. Lewis, Southwest Texas State University

Rodney Hassage, Southwest Texas State University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Poster Session E

Innsbruck

POSTER SESSION TOPIC: METHODOLOGY

A Comparison of Six Different Diagnostic Procedures Used to Check Raw Quantitative Data For Outliers in a Generic Science Education Study
James Randy McGinnis, University of Georgia

TUESDAY, APRIL 9

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2:00 - 3:15 P.M.

Poster Session F

Innsbruck

POSTER SESSION TOPIC: SCIENCE, TECHNOLOGY, & SOCIETY

A Study of the Importance Teachers Place on STS Issue Investigation and Action Training Instructional Goals

Patricia R. Simpson, St. Cloud University

POSTER SESSION TOPIC: INSTRUCTIONAL TECHNOLOGY

Using Interactive Video (Computer-Laser Disc) to Teach Earth Science, Astronomy and Biology to High School or Undergraduate Students

Pierce Farragher, University of Victoria

An Evaluation of ENLIST Micros III: Teacher Centers for Improving the Use of Microcomputers in Science Instruction

James D. Ellis, BSCS

Phil G. Goulding, BSCS

The Effectiveness of a Rural Model for Implementing Microcomputers in Science Teaching

Gail Shroyer, Kansas State University

Carol A. Borchers, Kansas State University

Larry G. Enochs, Kansas State University

Computer Assisted Tutorials in High School Biology: Do They Work?

Patricia D. Morrell, Oregon State University

Alleviating Computer Anxiety and Improving Attitude Toward Science Teaching Among Preservice Elementary Teachers Through Use of Videodisc Instructional Technology

Barbara Patterson, University of Maine

Ed Gosnell, University of Maine

Knowledge Acquisition Using Interactive Videodisc Technology

Lavinia Kumar, Rutgers University

TUESDAY, APRIL 9**2:00-3:15 P.M.****Poster Session H****Innsbruck**

POSTER SESSION TOPIC: CONCEPTUAL CHANGE

Exploration of Factors That May Determine What Misconceptions Prospective Elementary Teachers at Wayne University Have in Some Concepts of Physical Science

Rakad Arraf, Wayne State University

Shereen Arraf, Wayne State University

Often in Error, Rarely in Doubt, Assessing the Certainty Factor in Science Misconceptions

Joseph P. Riley, II, University of Georgia

Betty Crocker, University of North Texas

Concept Mapping to Identify Misconceptions, Create Cognitive Conflict, and Promote Conceptual Change

James H. Eck, Sirius Drive, Colorado Springs

Conceptually Integrated Instruction in Science: An Example

Kathryn F. Cochran, University of Northern Colorado

Student Descriptions of the Nature of Science

Stephen Marble, University of Texas at Austin

The Remediation of Misconceptions on Equilibrium of Chemical Reactions Among High School Pupils

Johan Strauss, Rand Afrikaans University

Jan Maarschalk, Rand Afrikaans University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Poster Session 1

Innsbruck

POSTER SESSION TOPIC: CONCEPT LEARNING

Student Abilities to Construct and Interpret Graphs: Contradictions Between the Results of Clinical Interviews and Multiple-choice Instruments

Craig A. Berg, University of Wisconsin-Milwaukee

Using Gowin's Vee Instrument for Clarity in Science Fair Presentations, Lab Reports, and the Reading of Professional Journals in Secondary Schools & Community Colleges

Laine Gurley-Dilger, Township High School District #214, Illinois

2:00 - 3:15 P.M.

Poster Session J

Innsbruck

POSTER SESSION TOPIC: SCIENCE LABORATORY

Accidents in Texas High School Chemistry Labs

Sandra S. West, Southwest Texas State University

Project SMART (Science/Mathematics Applied Resources for Teaching) "Kids at Work Program"

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

Suzanne Weber, State University of New York at Oswego

Barbara Beyerbach, State University of New York at Oswego

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Poster Session K

Innsbruck

POSTER SESSION TOPIC: EQUITY

Enhancing the Science Classroom Environment for Culturally Diverse Students: The Omaha Public School Experience

Elizabeth Kean, University of Nebraska-Lincoln

Effects of Science Leadership Involvement in the Classroom on Science Attitudes of Native American Elementary School Students

Diane Braley Miller, University of Kansas

Walter S. Smith, University of Kansas

Sex differences in the Choice of Undergraduate Scientific Programs of Study

Scott F. Marion, University of Maine

2:00 - 3:15 P.M.

Poster Session L

Innsbruck

POSTER SESSION TOPIC: ASSESSMENT AND LEARNING

The Planning Practices of Biology Teachers in Designing Tests and Other Assessment Procedures

Richard R. Sudweeks, Brigham Young University

J. Hugh Baird, Brigham Young University

Characteristics of Tests and Other Procedures Used by Biology Teachers

J. Hugh Baird, Brigham Young University

Richard R. Sudweeks, Brigham Young University

Assessing Attitude Toward Teaching Science with Qualitative and Quantitative Methodologies

Mark D. Guy, University of Georgia

The Development of an Information Link Between an Established Network of Individuals Working with Sustainable Development and Secondary Educators

Amanda L. Woods, Florida Institute of Technology

The Changing Role of Environmental Education

Terry Scott, Purdue University

Meaningful and Rote Learners' Mental Models of Meiosis and Selected Genetics Concepts

Ann Liberatore Cavallo, Syracuse University

The Effect of External Verbalization by Fifth Graders on the Development of Lever Concepts.

Glenda Carter, North Carolina State University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Poster Session L (continued)

Innsbruck

POSTER SESSION TOPIC: ASSESSMENT AND LEARNING

Learning Science Through Reading and Writing

Mark J. Volkmann, Purdue University

David G. O'Brien, Purdue University

Deborah Dillon, Purdue University

Joseph D. Ruhl, Jefferson High School

Analysis of Analogies Used by Science Teachers

Zoubeida Dagher, University of Delaware

Traditional Pre-Post Attitude Measurement Versus a Post Only Attitude Self-Assessment in an Elementary Science Methods Course.

D. Daryl Adams, Mankato State University

The Use of Pantomime to Enhance Elementary School Students' Understanding of Selected Abstract Science Concepts

Michael Kamen, University of Texas

Science Achievement in Rural Schools: Data from High School and Beyond

Scott F. Marion, University of Maine

Alex Rath, University of Maine

Walter G. McIntire, University of Maine

2:00 - 3:15 P.M.

Poster Session L (continued)

Innsbruck

POSTER SESSION TOPIC: ASSESSMENT AND LEARNING

The Relationship of Science Equipment Usage to the Attitudes and Achievement of Seventh-Grade Students

Ava Pugh, Northeast Louisiana University

Fred Groves, Northeast Louisiana University

Science Specialists', Classroom Teachers', and Preservice Education Majors' Stages of Concern Toward Cooperative Learning

John Settlage, Jr., University of Missouri

How College Students Feel About Dissection in Life Science Classes

Thomas R. Lord, Indiana University of Pennsylvania

A Triphasic Model of the Teaching and Learning Environment Based on Constructivist Principles

O. Roger Anderson, Columbia University

Sondra Akins, Columbia University

Ismael Calderon, Columbia University

Paulette Mapp, Columbia University

TUESDAY, APRIL 9

2:00 - 3:15 P.M.

Poster Session M

Innsbruck

POSTER SESSION TOPIC: PROCESS SKILLS

Problem Solving in Physics and Mathematics - What Do They Have in Common? (Creating a Base for Research and Teaching)

Hermann Sambs, University of Georgia

The Possible Relationship Between M-Space, Developmental Level and Genetics Problem Solving in Preservice Elementary Education Majors

Nancy D. Green, Purdue University

TUESDAY, APRIL 9

3:45 - 5:15 P.M.

Session A2.3

Windjammers

CONTRIBUTED PAPERS TOPIC: CONTENT KNOWLEDGE

President:

Ann C. Howe
University of Maryland

Discussant:

Norman Lederman
Oregon State University

Papers:

Content Representation

Debra Tomanek, University of Arizona

Strategies Used by Experienced Science Teachers to Transform Subject Matter Content Knowledge into Pedagogical Content Knowledge

Peter Lewis, Curtin University of Technology

David Treagust, Curtin University of Technology

A Comparison of Middle School Teachers' Content Knowledge and Pedagogical Content of Heat, Energy, and Temperature with Their Students' Content Knowledge of These Concepts

Joseph S. Krajcik, University of Michigan

John Layman, University of Maryland

Mary Starr, University of Michigan

Shirley Magnusson, University of Michigan

TUESDAY, APRIL 9

3:45 - 5:15 P.M.

Session B2.3

Waterfront

SYMPOSIUM TOPIC: IMPLEMENTING ACTIVITY-BASED LEARNING

Presider:

Teresa Kokoski
University of Georgia

Papers:

Lessons for Policy-Makers and School System Leaders
Ronald Anderson, University of Colorado

Origin, Design and Current Status of Project IMPACT
Uwe Hameyer, University of Kiel

Lessons for Principals and Teachers
Mats Ekholm, University of Gothenburg/Karlstad

Lessons for Support Personnel
Jan van der Akker, University of Twente

3:45 - 5:15 P.M.

Session C2.3

Nantucket North

PAPER SET TOPIC: PROFESSIONAL DEVELOPMENT OF SCIENCE TEACHERS

Presider:

Lloyd H. Barrow
University of Missouri-Columbia

Papers:

Framing the Science Support Teacher Program: Context, History, Assumptions, Training and Technical Assistance
James J. Gallagher, Michigan State University

The Documenters and the Documented Look at Change in Junior High School Science
Antonio Bettencourt, Michigan State University
Michael Petrosini, McTigue Junior High School, Toledo, OH

Another Pair of Eyes: On the Reflexivity of Ethnographic Research of a Science Teacher
Roberto Monteiro, Michigan State University
Lucille Vernile, DeVeaux Junior High, Toledo, OH

A Look at Science Teachers' Beliefs about Teaching and Learning
Josephine Zesaguli, Michigan State University

TUESDAY, APRIL 9

3:45 - 5:15 P.M.

Session C2.3 (continued)

Nantucket North

PAPER SET TOPIC: PROFESSIONAL DEVELOPMENT OF SCIENCE TEACHERS

“Talking Less and Listening More”: An Integral Part of Relating to Students and Peers in a Science Support Teacher Program

Janet Luallen, Robinson Junior High School, Toledo, OH

Douglas Leonard, Byrnedale Junior High School, Toledo, OH

From the Claws of Scilla into the Teeth of Charybdis: Tales of a Teacher Making Sense of Science Education Research

David Cline, Michigan State University

Norman Jamison, Robinson Junior High School, Toledo, OH

3:45 - 5:15 P.M.

Session D2.3

Nantucket South

CONTRIBUTED PAPERS TOPIC: CONSTRUCTIVISM

Presider:

Karen Sullenger
University of New Brunswick

Discussant:

David F. Treagust
SMED, Curtin University of Technology

Papers:

A Construction of the Actional Dimension of Children's Science
Sharon Parsons, Florida State University

CLES: An Instrument for Assessing Constructivist Learning Environments
Peter C. Taylor, Curtin University of Technology
Barry J. Fraser, Curtin University of Technology

The Information - Constructivist (I-C) Perspective: Applications to and Implications for Science Education
Robert J. Stahl, Arizona State University

TUESDAY, APRIL 9

3:45 - 5:15 P.M.

Session E2.3

Innsbruck

CONTRIBUTED PAPERS TOPIC: INSTRUCTIONAL TECHNOLOGY

Presider:

Michale Grote
University of Cincinnati

Discussant:

Robert D. Sherwood
Peabody College / Vanderbilt University

Papers:

Computer-video-based Activities to Facilitate Learning in Geometrical Optics

Fred Goldberg, San Diego State University
Sharon Bendall, San Diego State University
Nina Bach, San Diego State University

Microcomputer-Based Laboratories and Computer Networking in High School Science Classrooms

James D. Lehman, Purdue University
John Campbell, Purdue University

An Analysis of TERC Star Schools Network Communication

James L. Neujahr, City College of CUNY

3:45 - 5:15 P.M.

Session F2.3

Ballroom II

PAPER SET TOPIC: CONCEPTUAL CHANGE

Presider:

Nancy Romance
Florida Atlantic University

Discussant:

Jean Lythcott
Teachers College, Columbia University

Papers:

Conceptual Change Instruction

Peter W. Hewson, University of Wisconsin-Madison

The Development of a Framework Based on the Conceptual Change Model for the Interpretation of Science Classroom Discourse

N. Richard Thorley, University of Rochester

Conceptual Change Analysis of Sixth Grader Students' Ability to Discuss the Status of Their Conceptions of Force and Motion

Sr. M.G. Hennessey, St Ann's School

Extreme Cases and Models in Students' Learning

Aletta Zietsman, University of Witwatersand

John Clement, University of Massachusetts

TUESDAY, APRIL 9

3:45 - 5:15 P.M.

Session G2.3

Ballroom III

SYMPOSIUM TOPIC: GRADUATE STUDENTS SPEAK: RESEARCH ON GRADUATE SCIENCE EDUCATION

Presider/Discussant:

Kenneth G. Tobin

Florida State University

Behavior and Attitude of Science Education Graduate Students: A Case Study

James Randy McGinnis, University of Georgia

The Role of Faculty Philosophies on the Training of Science Education Doctoral Students: A Case Study

Andrew T. Lumpe, Kansas State University

A Case for Explicit Understandings

Stephen Marble, University of Texas at Austin

Attitude of Graduate Students Toward Academic Education and Research in Science Education: A Case Study

Genzo Nakayama, Hiroshima University

Case Studies of SESAME (Search for Excellence in Science and Mathematics Education) and EMST (Education in Mathematics, Science, and Technology)

Graduate Programs at the University of California: Integration of Philosophy with Curriculum, Learning, and Teaching

Eileen Lob Lewis, University of California, Berkeley

TUESDAY, APRIL 9

7:30 - ?

NARST Interest Groups

Ballroom 1 & 1A

All individuals who are interested in organizing or joining a NARST Interest Group for the purpose of discussion and networking should meet in Ballroom I or IA. The bulletin board at the registration desk can be used on Sunday, Monday or Tuesday to advertise for and sign-up for any area that you think will generate the critical mass of individuals.

WEDNESDAY, APRIL 10

8:30 - 10:00 A.M.

Session A3.1

Windjammers

CONTRIBUTED PAPERS TOPIC: TEACHERS' BELIEFS

Presider:

Michael E. Hale
University of Georgia

Papers:

Teachers' Beliefs and Classroom Interactions: Lessons From High School Chemistry
Amy J. Phelps, Florida State University

Case Studies as Reflections of Science and Mathematics Teachers' Beliefs: The Utility of a Narrative System of Analysis
Deborah J. Tippins, University of Georgia

Referents for Thoughts and Actions in Science Classrooms
Kenneth Tobin, Florida State University

Implementing Cooperative Learning in High School Chemistry Classes: A Case Study of Practical Change
Carol Briscoe, Florida State University

WEDNESDAY, APRIL 10

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8:30 - 10:00 A.M.

Session B3.1

Waterfront

SYMPOSIUM TOPIC: EPISTEMOLOGICAL THEORIES

Presider:

John R. Staver

Kansas State University

From Galileo to Piaget: How Do We Construct Epistemological Theories

Mansoor Niaz, Universidad de Oriente

Anton E. Lawson, Arizona State University

Richard F. Kitchener, Colorado State University

WEDNESDAY, APRIL 10

8:30 - 10:00 A.M.

Session C3.1

Nantucket North

CONTRIBUTED PAPERS TOPIC: STUDENT PERCEPTION AND ATTITUDES

Presider:

J. Preston Prather
University of Virginia

Discussant:

Thomas R. Koballa
University of Georgia

Papers:

The Meaning of Science to Eight Through Fourteen Year Olds: Differentiation and Devaluation During the Threshold Years.
Elisabeth Charron, Montana State University

Affective Outcomes Associated with Cooperative Learning in an Undergraduate Physics Course for Non-Science Majors
Carol L. Stuessy, Texas A&M University

The Relationship Between Tracking Levels and Teacher and Students Perceptions of Their High School Introductory Science Course Quality
Dennis B. Travis, Bloomfield Hills School District, Michigan

CONTRIBUTED PAPERS TOPIC: INSTRUCTIONAL TECHNOLOGY

Presider:

Karen L. Ostlund
Southwest Texas State University

Papers:

Attitudes, Beliefs, and Perceived Needs of Science Teachers Toward the Uses of Computing Technologies

James Randy McGinnis, University of Georgia

Larry Hatfield, University of Georgia

Patricia E. Simmons, University of Georgia

John Olive, University of Georgia

Mary M. Atwater, University of Georgia

Anita Hunt, University of Georgia

The Effects of Microcomputer-Based Laboratory Exercises on Achievement and Attitude Toward Physical Science of Pre-service Middle School Teachers

William Barrow, University of Georgia

Michael J. Padilla, University of Georgia

A Microcomputer Beliefs Inventory for Middle School Students: Scale Development and Validation

Iris M. Riggs, California State University, San Bernardino

Larry G. Enochs, Kansas State University

A Profile of Users of a Level One Video-Disc-Based Elementary School Science Program

James P. Barufaldi, University of Texas at Austin

Lowell J. Bethel, University of Texas at Austin

Gayle V. Davidson, University of Texas at Austin

WEDNESDAY, APRIL 10

8:30 - 10:00 A.M.

Session E3.1

Innsbruck

CONTRIBUTED PAPERS TOPIC: CONTENT LEARNING

Presider:

Larry D. Yore
University of Victoria

Discussant:

Dale R. Baker
Arizona State University

Papers:

Improving Chemistry Achievement Through Emphasis on the Particle Nature of Matter

Dorothy Gabel, Indiana University

Diane M. Bunce, Catholic University of America

A Cross-Age Study of Five Chemistry Concepts

Vickie M. Williamson, University of Oklahoma

Michael R. Abraham, University of Oklahoma

Susan L. Westbrook, Norman Public School

Student Learning in Biology and Physics: The Effects of Study Strategy and Learning Context

Michael Prosser, University of Sydney

Elizabeth Hegarty-Hazel, University of Technology, Sydney

8:30 - 10:00 A.M.

Session F3.1

Ballroom II

CONTRIBUTED PAPERS TOPIC: PROBLEM SOLVING AND CREATIVE THINKING

Presider:

J. Nathan Swift
SUNY - Oswego

Papers:

The Construction and Application of a Cognitive-Network Model of Prediction Problem Solving
Derrick R. Lavoie, Montana State University

Enhancing Higher Order Thinking Skills in Science Education
Suzanne Wegener Soled, University of Cincinnati

The Effect of Applying Structured-Scientific-Enquiry (SSE) Instruction Model in the Gifted Education
Sheng-Hsiao Chung, Taiwan Provincial Taipei Teachers College

Development of Creative Thinking and Inventiveness: Some Recent Approaches
Alan J. McCormack, San Diego State University
Christine Ebert, University of South Carolina
Edward S. Ebert, University of South Carolina

WEDNESDAY, APRIL 10

8:30-10:00 A.M.

Session G3.1

Ballroom III

CONTRIBUTED PAPERS TOPIC: RESEARCH METHODS

Presider:

Joseph S. Krajcik
University of Michigan

Discussant:

Carolyn Carter
Ohio State University

Papers:

A Field Test and Evaluation of a New Tool for Qualitative Research in Computer Assisted Instruction

Nancy D. Green Glenn, Purdue University
James Hood, Purdue University
Kirk Janowiak, Purdue University

Variables Influencing the Meaning of Labels in Qualitative Research

Barbara S. Spector, University of South Florida
Merton L. Glass, University of South Florida

A Study of Science Teaching Efficacy Using Qualitative and Quantitative Research Methods

Charlene M. Czerniak, University of Toledo

10:30-12:00 P.M.

Session A3.2

Windjammers

CONTRIBUTED PAPERS TOPIC: CONCEPTIONS OF PROSPECTIVE TEACHERS

Presider:

Hermann Sams
University of Georgia

Discussant:

Elisabeth Charron
Montana State University

Papers:

The Effect of Different Teaching Strategies on Preservice Elementary Teachers Physical Science Misconceptions
Tung-hsing Hsiung, University of Georgia
Joseph P. Riley, University of Georgia

The Design and Validation of an Instrument to Identify Preservice Elementary Teachers' Intuitive and School Knowledge of the Concepts of Surface Area/
Volume and States of Matter
Diana C. Rice, University of South Carolina
Dorothy L. Gabel, Indiana University
Lawrence Brown, Indiana University

Attempts at Sense-Making: Preservice Secondary Science Teachers Explanations of Scientific Phenomena
James J. Gallagher, Michigan State University
David F. Treagust, Curtin University of Technology

WEDNESDAY, APRIL 10

10:30-12:00 P.M.

Session B3.2

Waterfront

SYMPOSIUM TOPIC: NSTA/AAAS/NARST TASK FORCE FOR DEFINING A RESEARCH AGENDA IN SCIENCE EDUCATION

Presider/Presenter:

Emmett Wright, Kansas State University
Task Force Chairman

Discussants:

Members of Task Force

WEDNESDAY, APRIL 10

10:30-12:00 P.M.**Session C3.2****Nantucket North**

CONTRIBUTED PAPERS TOPIC: PROBLEM SOLVING AND CRITICAL THINKING**Presider:**

Richard Williams
University of Victoria

Papers:

Early Problem Solving Stages of Subjects Interacting with a Genetics Computer Simulation

Patricia E. Simmons, University of Georgia
Judith Kinnear, LaTrobe University

A Breach in the Relationship Between Correctness and Scientific Conceptual Knowledge for the Meaningful Solving of a Problem about Osmosis

June T. Zuckerman, Queens College, CUNY

The Effect of the Consistent Use of General Problem Solving Strategy on Physics Knowledge Organization

Ronald Keith, University of Minnesota
Patricia Heller, University of Minnesota

Incorporation of Critical Thinking Within a Regular High School Biology Curriculum

Pinchas Tamir, Israel Science Teaching Center of Jerusalem

CONTRIBUTED PAPERS TOPIC: EDUCATING PROSPECTIVE SCIENCE TEACHERS

Presider:

Carol L. Stuessy
Texas A & M University

Papers:

The Effect of an Integrated Content and Process Science Methods Course on Preservice Teachers' Orientation Toward Teaching Elementary Science

Nancy Romance, Florida Atlantic University
Michael R. Vitale, East Carolina University

Restructuring College Science Courses for Elementary Preservice Teachers: Some Research Findings

Mary Antony, University of Michigan
Burton E. Voss, University of Michigan

Teaching a Hypothesis Testing Strategy to Prospective Teachers

Michael D. Piburn, Arizona State University

The Influence of Hands-On Science Process Skills Training on Preservice Elementary Teachers' Concerns and Anxiety about Teaching Hands-On Science Activities in Taiwan, R.O.C.

Shu-Mey Yu, University of Texas at Austin
Lowell J. Bethel, University of Texas at Austin

10:30-12:00 P.M.

Session E3.2

Innsbruck

CONTRIBUTED PAPERS TOPIC: SCIENCE LEARNING

Presider:

Steven J. Rakow
University of Houston-Clear Lake

Discussant:

J. Steve Oliver
University of Georgia

Papers:

An Analysis of the Relationship Between Student-Invented Hypothesis Testing and Development of Reflective Thinking Strategies

Susan L. Westbrook, Norman Public Schools
Laura N. Rogers, University of Oklahoma

Student Science Knowledge Related to Environmental Problems: An Analysis of Three Studies

Michael J. Brody, Oregon State University

The Effects of Text Composition on Student Organization of Science Content Using a Hierarchical-Network Model of Analysis

O. Roger Anderson, Columbia University
Scott Nelson, Columbia University
Kathleen McClure, Columbia University

WEDNESDAY, APRIL 10

10:30-12:00 P.M.

Session F3.2

Ballroom II

CONTRIBUTED PAPERS TOPIC: PROBLEM SOLVING AND CREATIVE THINKING

Presenter:

Ann Liberatora-Cavallo
Syracuse University

Discussant:

Peter A. Rubba
Pennsylvania State University

Papers:

Effects of an Environmental Education-Related STS Approach on the Cognitive Structures of Preservice Science Teachers
John R. McClure, Pennsylvania State University
Paul E. Bell, Pennsylvania State University

Implementing Technology Within the Curriculum: A Case Study Involving Six Secondary Schools
David F. Treagust, Curtin University of Technology
Leonie J. Rennie, Curtin University of Technology

Teaching Technology as a Design Process: An Evaluation of Curriculum Materials for Middle School Science
Leonie J. Rennie, Curtin University of Technology
David F. Treagust, Curtin University of Technology
Adrienne Kinnear, WACAE Churchlands Campus

WEDNESDAY, APRIL 10**10:30-12:00 P.M.****Session G3.2****Ballroom III****CONTRIBUTED PAPERS TOPIC: CONCEPT KNOWLEDGE REPRESENTATION****Presider:**

Patricia Kerr
University of North Dakota

Discussant:

Robert J. Stahl
Arizona State University

Papers:

Scoring Student-Generated Concept Maps in Introductory College Chemistry

Debbie Schrieber, Wentworth Institute of Technology
Gerald L. Abegg, Boston University

The Effect of Level of Information as Presented by Different Technologies on Student's Understanding of Acid, Base, and pH Concepts

Mary B. Nakhleh, Purdue University
Joseph S. Krajcik, University of Michigan

Translation of Representations of the Structure of Matter and its Relationship to Reasoning, Gender, Spatial Reasoning, and Specific Prior Knowledge

Patricia Keig, California State University, Fullerton
Peter A. Rubba, Pennsylvania State University

WEDNESDAY, APRIL 10

12:00-1:00 P.M.

NARST Annual Business Meeting

Ballroom 1

Presiders:

Russell H. Yeany, NARST President 1991-92

John Staver, Executive Secretary

All NARST members are invited to attend this meeting.

NARST COMMITTEES 1990-91

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 Glen Aikenhead (1992)
 Saouma BouJaoude (1992)
 Reinders Duit (1992)
 Geoff Giddings (1992)
 Avi Hofstein (1992)
 Doris Jorde (1992)

LIST OF PARTICIPANTS

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