NATIONAL ASSOCIATION
FOR RESEARCH
IN SCIENCE TEACHING

1978 NARST Annual
Meeting Program

Toronto, Canada
Hotel Toronto
March 31 - April 2
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PROGRAM COMMITTEE

James R. Okey, Chairman University of Georgia
Patricia Blosser Ohio State University
William Holliday University of Calgary
John Koran University of Florida
Laura C. Trout Indiana University
Arthur White Ohio State University

LOCAL ARRANGEMENTS COMMITTEE

Douglas A. Roberts, Chairman Ontario Institute for Studies in Education
Brent Kilbourn Ontario Institute for Studies in Education
Santos Mahung Ontario Institute for Studies in Education
A. Hugh Munby Queen's University
Graham Orpwood Ontario Institute for Studies in Education
Thomas Russell Queen's University
T. J. Elgin Wolfe University of Toronto
Lila Wolfe McGill University

FUTURE MEETINGS OF NARST

1979 With NSTA Atlanta
1980 With AERA New Orleans
1981 With NSTA New York
REGISTRATION INFORMATION

Registration for the Meeting will be conducted in the Convention Foyer of the Hotel Toronto. Both persons who have preregistered and those who have not will be able to obtain the following at the registration table:

- Book of Abstracts of Papers
- Registration Badge
- Ticket to the Luncheon

The registration fee for members and non-members of NARST includes a banquet ticket to the annual luncheon. The annual luncheon program contains the presentation of the annual JRST award, an award for completed research and a special address by Robert Yager.

PLACEMENT SERVICE

A placement desk and bulletin boards will be set up in the registration area. This will provide for the posting of information about jobs available and personnel seeking employment. Interested parties may post information and addresses on the bulletin board and arrange interviews on their own. For further information, interested parties should see or contact NARST's Coordinator of Placement:

Dr. Alan M. Voelker
Northern Illinois University
DeKalb, Illinois 60115
NARST OFFICERS

1977-1978

PRESIDENT
Roger G. Olstad
University of Washington
Seattle, WA  98195

PRESIDENT ELECT
James R. Okey
University of Georgia
Athens, GA  30602

IMMEDIATE PAST PRESIDENT
O. Roger Anderson
Teachers College - Columbia University
New York, NY  10027

EXECUTIVE SECRETARY
Paul Joslin
Drake University
Des Moines, IA  50311

RESEARCH COORDINATOR
Arthur White
Ohio State University
Columbus, OH  43210

EDITOR, JOURNAL OF RESEARCH IN SCIENCE TEACHING
David P. Butts
University of Georgia
Athens, GA  30602

BOARD MEMBERS

Carl F. Berger (1980)
University of Michigan
Ann Arbor, MI  48109

Glen D. Berkheimer (1978)
Michigan State University
East Lansing, MI  48823

James J. Gallagher (1978)
Michigan State University
East Lansing, MI  48823

J. W. George Ivany (1979)
Simon Fraser University
Burnaby, British Columbia, Canada

Rita W. Peterson (1980)
California State University
Hayward, CA  94542

Ronald J. Raven (1979)
State University of New York
Amherst, NY  14260
PRESIDENTS OF NARST

1928 W. L. Eikenberry
1929 W. L. Eikenberry
1930 W. L. Eikenberry
1931 Elliot R. Downing
1932 Elliot R. Downing
1933 Francis D. Curtis
1934 Ralph K. Watkins
1935 Archer W. Hurd
1936 Gerald S. Craig
1937 Walter G. Whitman
1938 Hanor A. Webb
1939 Ralph Powers
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. Thiele
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. Van Deventer
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 O. Pella
1967 H. Craig Sipe
1968 John M. Mason
1969 Joseph D. Novak
1970 Willard J. 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 C. Roger Anderson
1978 Roger G. Olstad

1977 PATRON MEMBERS

Robert E. Yager
H. Craig Sipe
Robert Harbrecht
Ralph W. Lefler

1977 SUSTAINING MEMBERS

O. Roger Anderson
H. A. Burnett
Donald G. Peterson
Ronald J. Raven
51st ANNUAL MEETING OF THE
NATIONAL ASSOCIATION FOR RESEARCH
IN SCIENCE TEACHING

March 31-April 2, 1978
Hotel Toronto
Toronto, Ontario, Canada

March 31
Friday
9:00 - 5:00
REGISTRATION
Convention Foyer

Friday
8:00 - 12:00
EXECUTIVE BOARD MEETING
Richmond Room

Presiding:
Roger G. Olstad
University of Washington
Seattle, WA 98195

Friday
1:00 - 2:15
GENERAL SESSION ONE
Toronto I

Presiding:
O. Roger Anderson
Teachers College - Columbia University
New York, NY 10027

Speaker:
Practice Makes Perfect? No,
Practice Makes Theory

David Hunt
Department of Applied Psychology
Ontario Institute for Studies in Education
Toronto, Ontario, Canada M5S 1V6

CONCURRENT SESSION A

Friday
2:30 - 3:30
Session A-1 Critique: Cognitive Development

Presiding:
Rodney L. Doran
SUNY at Buffalo
Amherst, NY 14260

-1-
Selected Correlates of Piagetian Puzzles

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

A Study of Hierarchical Classification in Concrete and Formal Thought

Walter E. Lowell
Memorial University
St. John's, Newfoundland, Canada

Discussant: Ann Howe
Syracuse University
Syracuse, NY 13210

Friday
2:30 - 3:30 Session A-2 Teacher Education Lismer

Presiding: Richard L. Campbell
Florida International University
Miami, FL 33199

The Effect of Studying Different Question Classification Systems on Preservice Teachers' Ability to Classify Questions and Attitudes Toward Questioning

Joseph P. Riley II
University of Georgia
Athens, GA 30602

An Experimental Study Comparing the Effect of Three Modes of Instruction on Metric Knowledge and Attitudes of Preservice Elementary Teachers

Charlotte Hess
Bloomsburg State College
Bloomsburg, PA 17815

and

Robert L. Shrigley
Pennsylvania State University
University Park, PA 16802
Elementary Teacher Attitudes on Teaching Styles in Relation to Their Science Background and Organizational Climate

David R. Stevenson
Chiganois Elementary School
Masstown, Nova Scotia, Canada

and

John Butzow
University of Maine at Orono
Orono, ME 04473

Friday
2:30 - 3:30
Session A-3  Cognitive Development  McDonald

Presiding:  Jane B. Bowyer
Mills College
Oakland, CA  94613

The Acquisition of Propositional Logic and Advanced Cognitive Strategies in Grades 6-14

Anton E. Lawson
Arizona State University
Tempe, AZ  85281

and

Robert Karplus
University of California
Berkeley, CA  94720

and

Helen Adi
Northern Illinois University
DeKalb, IL  60115

The Relationship Between the Proportional Reasoning Ability of Ninth Graders and Their Achievement of Selected Math and Science Concepts

Eugene L. Chiappetta
University of Houston
Houston, TX  77004

and

John W. McBride
University of Houston
Houston, TX  77004
Actualizing Teaching Intentions by Concrete and Formal Operational Prospective Elementary School Teachers in Nigeria

Olusola J. Ehindero
University of Ife
Ile-Ife, Nigeria

Friday 2:30 - 3:30  Session A-4  Paper Set: Student Varley Behaviors

Presiding: Chris A. Pouler
Prince George's County Public Schools
Hyattsville, MD 20782

Values and Their Relation to Course Selection and Success at the High School Level

Louis J. Visco
Rutgers University
New Brunswick, NJ 08901

The Conditions Necessary to Develop the Social Reasoning Required to Solve Moral Issues Prevalent in Our Technological Society

June P. Maul
Rutgers University
New Brunswick, NJ 08901

The Relations Among Attitudes Toward Science, Field Dependence-Independence, Intelligence, and Science Grades

Joseph G. Krajkovich
Rutgers University
New Brunswick, NJ 08901

CONCURRENT SESSION B

Friday 3:45 - 4:45  Session B-1  Paper Set: Research Harris Methodology

Presiding: David L. VanHarlingen
Rutgers University
New Brunswick, NJ 08901
Methodological Issues in Research: The Need for Improved Instrumentation and Model Building

David L. VanHarlingen
Rutgers University
New Brunswick, NJ 08901

Criteria for Assessing Correlational Ability

Janey Cheu
Rutgers University
New Brunswick, NJ 08901

Analysis of Class Inclusion Response Identification Types

Jean Sindhikara
Rutgers University
New Brunswick, NJ 08901

A Study on Proportional Reasoning

Sharon D. Brendzel
Rutgers University
New Brunswick, NJ 08901

Friday
3:45 - 4:45 Session B-2 Formal Operational Lismer Thinking

Presiding: Livingston S. Schneider
University of California
Berkeley, CA 94720

Math and Logic Skills Exhibited by College Freshman Chemistry Students

Ronald G. Good
Florida State University
Tallahassee, FL 32306

and

Guy Morin
Florida State University
Tallahassee, FL 32306

Interaction of Formal Operational Capability with Instructional Feedback Mode

F. David Boulanger
University of Illinois
Chicago, IL 60680

-5-
The Effect of Intensive Instruction in Cue Attendance On Solving Formal Operational Tasks

Emmett L. Wright
University of Maryland
College Park, MD 20742

Friday
3:45 - 4:45
Session B-3 Panel: Learning McDonald Theory

Presiding: Marlin L. Languis
Ohio State University
Columbus, OH 43210

Issues Related to Physiological Indices of the Learning Process and Redefinition of Learning Theory

Panel
Members: Rosemarie Harter Kraft
University of California
Davis, CA 95616

Marlin L. Languis
Ohio State University
Columbus, OH 43210

Victor Rentel
Ohio State University
Columbus, OH 43210

Friday
3:45 - 6:00
Session B-4 Training Session Varley

Selecting and Applying Multiple Comparison Techniques for Post Hoc Analyses of Data

Leader: Russell H. Yeany
University of Georgia
Athens, GA 30602

Much of the current research in science education involves multiple-level factors and requires the application of post-hoc analysis procedures to identify loci of differences. There are at least six common procedures available for this purpose. Not
all of these are equally powerful, applicable or appropriate to a given situation. The purpose of this workshop is to acquaint participants with a variety of multiple comparison techniques, their strengths and weaknesses, and the appropriateness of their application in a given context.

The activities of the session will include an examination of techniques such as Planned Orthogonal Contrasts, Newman-Keuls, and Dunnett's test. A flow chart for selecting appropriate procedures will be presented and participants will interpret results and error terms associated with each technique.

CONCURRENT SESSION C

Friday
5:00 - 6:00  Session C-1  Attitude Studies            Harris

Presiding: Glenn C. Markle
University of Cincinnati
Cincinnati, OH  45221

Attitudes and Knowledge: Results of a Field Test in Cancer Education for Teachers

Elaine J. Anderson  
Pennsylvania State University  
University Park, PA   16802

and

G. Boyer  
Pennsylvania State University  
Hershey, PA   17033

and

E. Miller  
Edinboro State College  
Edinboro, PA   16442

The Relationship of the Learning Environment to Student Attitudes Toward Chemistry

Barry L. Manley  
Coventry Public Schools  
Coventry, RI   02816
The Effects of an Energy-Environment Simulator Upon Selected Energy-Related Attitudes of Science Students and In-Service Teachers

David L. Dunlop
University of Pittsburgh
Johnstown, PA 15904

Friday 5:00 - 6:00 Session C-2 General Research Lismer

Presiding: Lynn W. Glass
Iowa State University
Ames, IA 50011

Scientific Concept Learning in Children Subsequent to A-T Instruction: The Effect of Prior Knowledge on Resulting Cognitive Structure

Leon A. Pines
University of Maine
Farmington, ME 04938

The Effect of Field-Dependence-Independence and Instructional Sequence on the Achievement of High School Biology Students

Claudia B. Douglass
Central Michigan University
Mt. Pleasant, MI 48858

The Learning Environment: Where You Learn Affects What You Learn

John H. Falk
Chesapeake Bay Center for Environmental Studies
Edgewater, MD 21037

and

John D. Balling
Chesapeake Bay Center for Environmental Studies
Edgewater, MD 21037

and

W. Wade Martin
Catholic University of America
Washington, DC 20024

-8-
Friday
5:00 - 6:00  Session C-3  Critique: Cognitive McDonald Structure

Presiding: David F. Treagust
University of Iowa
Iowa City, IA  52242

A Comparison of the Effects of Advanced Organizers and/or Behavioral Objectives on the Achievement of Disadvantaged Biology Students

Jane B. Kahle
Purdue University
West Lafayette, IN  47907

The Effects of Advanced Organizers and Behavioral Objectives on the Facilitation of Learning and Retention of a Biology Unit

Samuel P. Varano
Shamokin Area School District
Shamokin, PA  17872

and

H. Seymour Fowler
Pennsylvania State University
University Park, PA  16802

Discussant: Joseph D. Novak
Cornell University
Ithaca, NY  14853

Friday
5:00 - 6:00  Session C-4  Training Session  Varley
(Continuation of Session B-4)

Friday
6:00 - 7:00  SOCIAL HOUR  Convention Foyer

Friday
8:00 - 9:00  Canadian University Science Varley
Educators

Presiding: Glen S. Aikenhead
University of Saskatchewan
Saskatoon, Saskatchewan, Canada
S7N 0WO
April 1
Saturday
7:00 - 8:15 NARST COMMITTEE MEETINGS

Persons chairing all standing and special committees of NARST (e.g., Program, Publications Advisory, Election, etc.) are encouraged to assemble continuing and new committee members for organization meetings at this time. No rooms have been set aside for these meetings. Make any informal breakfast arrangements that you wish.

Saturday
7:15 - 8:30 JRST EDITORIAL BOARD BREAKFAST

Members of the editorial board of the Journal of Research in Science Teaching should contact David Butts for the location of this meeting.

Saturday
8:00 - 5:00 REGISTRATION Convention Foyer

CONCURRENT SESSIONS D

Saturday
8:30 - 9:30 Session D-1 Paper Set: Preservice Harris Teacher Education

Presiding: Hans O. Andersen
Indiana University
Bloomington, IN 47401

A Systems Approach to Elementary Science Curriculum Improvement

Hans O. Andersen
A. W. Strickland
Indiana University
Bloomington, IN 47401
Examining the Differential Effects of Three Information Processing Models on Students' Performance in Classifying Vertebrates

Judith Ann Eggins
A. W. Strickland
Margaret M. Clark
Indiana University
Bloomington, IN 47401

An Examination of Spatial Performance by Pre-Service Elementary School Teachers

Dan R. Jones
A. W. Strickland
Indiana University
Bloomington, IN 47401

An Analysis of the Ecological Attitudes and Knowledge of Pre-Service Elementary Teachers by Personality Types

Munawar A. Anees
A. W. Strickland
John R. Staver
Indiana University
Bloomington, IN 47401

Dimensions of Grouped and Individual Performance Using Computer Assisted Instruction in Elementary Science Methods
A. W. Strickland
Indiana University
Bloomington, IN 47401

Analysis of Student Performance in Elementary Science Methods: Examining Personality Type Characteristics and Testing Format

Margaret M. Clark
A. W. Strickland
Indiana University
Bloomington, IN 47401

Saturday
8:30 - 9:30
Session D-2 Roundtables
Lismer

Presiding: Douglas Huegel
Dalhousie University
Halifax, Nova Scotia, Canada
B3H 3J5
The Effect of Cue Specificity on Learning of Material in Graphs

Sandra Kirk
University of North Florida
Jacksonville, FL 32216

and

Donald Kauchak
University of Utah
Salt Lake City, UT 84112

and

Paul Eggen
University of North Florida
Jacksonville, FL 32216

The Comparative Effects of Kinetic Structure on Knowledge Acquisition and Affective Response: An Experimental Investigation of Two Biology Sound Motion Picture Films

Ellen S. Simmons
Teachers College
New York, NY 10035

Applications of Pattern Analysis (Macroanalysis) in Classroom Interaction Research

James A. Shymansky
University of Iowa
Iowa City, IA 52242

and

John E. Pennick
University of Iowa
Iowa City, IA 52242

Saturday 8:30 - 10:45 Session D-3 Training Session McDonald

Planning and Designing Evaluation Studies

Leader: Wayne W. Welch
University of Minnesota
Minneapolis, MN 55455

Several practical considerations in the planning and design of evaluation studies will be addressed in this session. Key
planning concepts to be discussed include program descriptions, evaluation purposes, roles, audiences, and evaluative questions. Examples from actual science education programs will be used to illustrate these concepts.

A menu of evaluation frameworks (models) will be presented, but major emphasis will be placed on a dozen or so evaluation strategies that have evolved in recent years. Examples include such things as adversary teams, case studies, experiments, and goal-free evaluations.

Saturday  
8:30 - 10:45  Session D-4  Training Session  Varley

Multiple Regression Analysis Techniques in Science Education Research

Leaders:  G. W. Moser  
P. Rojas  
N. Rojas  
M. Duffy  
G. Ziccarelli  
University of Pittsburgh  
Pittsburgh, PA  15213

The purpose of the training session is to help science educators use multiple regression techniques and understand the results of treatments. Computer program treatments of study data will be practically presented, in an informal manner designed for your exploring the use of techniques. The techniques will be for coding binary variables, coding designs for partitioning samples, selecting the best subset of sets of independent variables, isolating pre-post test effects, defining disturbances in models, identifying spurious independent variables, developing reasonable extrapolations in forecasts, and determining the aptness of forecast models.

CONCURRENT SESSION E

Saturday  
9:45 - 10:45  Session E-1  Symposium: Proportional Reasoning  Harris

Presiding:  Rita W. Peterson  
California State University  
Hayward, CA  94542
Proportional Reasoning at the University Level: Alternative Task Analyses and Teaching Modes

Members:  Frank Collea  
California State University  
Fullerton, CA  92634

Susan Nummendal  
California State University  
Long Beach, CA  90801

Rita W. Peterson  
California State University  
Hayward, CA  94542

Eric Streitberger  
California State University  
Fullerton, CA  92634

Saturday  
9:45 - 10:45  
Session E-2  
Paper Set: Curriculum Lismer Evaluation

Presiding:  Jerome L. Ciesla  
Florida State University  
Tallahassee, FL  32306

An Evaluation of Biology Curricula and Its Implications for the Teaching of Science: Rationale/Strategy for the Study

Howard H. Osburn  
Concordia College  
Moorhead, MN  56560

An Evaluation of Biology Curricula and Its Implications for the Teaching of Science: Methodology and Findings

Leslie C. Mieves-Squires  
Concordia College  
Moorhead, MN  56560
An Evaluation of Biology Curricula and Its Implications for the Teaching of Science: Response to the Findings

E. Daniel McKenna
Concordia College
Moorhead, MN  56560

Saturday
9:45 - 10:45  Session E-3 Training Session  McDonald
            (Continuation of Session D-3)

Saturday
9:45 - 10:45  Session E-4 Training Session  Varley
            (Continuation of Session D-4)

Saturday
11:00 - 11:45  ANNUAL BUSINESS MEETING
Presiding: Roger G. Olstad
University of Washington
Seattle, WA  98195

Saturday
12:00 - 1:45  ANNUAL LUNCHEON
Presiding: Roger G. Olstad

    Introduction

    Recognition of Program Committee

    Recognition of Local Arrangements Committee

    Recognition of New and Past Officers and Board Members

    NARST Award Presentation -- John T. Wilson
        Chair

    JRST Award Presentation -- Donald E. Riechard
        Chair

    Installation of New President
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<td>7:30-9:30</td>
<td>INTERNATIONAL MEETING</td>
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Speaker: NARST--A Look Ahead  
Robert E. Yager  
University of Iowa  
Iowa City, IA  52242

CONCURRENT SESSION F

Saturday  
2:00 - 3:00  
Session F-1  NARST Award Paper  Harris

Presiding: John T. Wilson  
University of Iowa  
Iowa City, IA  52242

The outstanding paper given at the 1977 annual meeting will be presented again and discussed.

Saturday  
2:00 - 3:00  
Session F-2  General Research  Lismer

Presiding: Mae T. Lee  
Project City Science  
New York, NY  10003

Cognitive Preferences: A Validation Study.

Euwe van den Berg  
Vincent N. Lunetta  
University of Iowa  
Iowa City, IA  52242

and

Pinchas Tamir  
Hebrew University  
Jerusalem, Israel

A Research Model for Examining the Acquisition, Use, and Effectiveness of Teaching Skills

James R. Okey  
Russell H. Yeany  
William R. Capie  
University of Georgia  
Athens, GA  30602

-16-
The Congruence of Stated Research Preferences and Published Research of Science Education Researchers

Joe C. Long
David P. Butts
University of Georgia
Athens, GA 30602

and

David H. May
Whitman College
Walla Walla, WA 99362

Saturday 2:00 - 3:00 Session F-3 Roundtables McDonald

Presiding: Michael Szabo
Pennsylvania State University
University Park, PA 16802

The Relationships of Student Anxiety and Dependency to the Effects of Teaching Structure on the Learning of Science Knowledge and Processes Within Inductive Discovery Learning

David J. Harmon
Duval County School System
Jacksonville, FL 32207

Differential Effects of Science Study Questions

William G. Holliday
Harold G. Whitaker
K. D. Loose
University of Calgary
Calgary, Alberta, Canada T2N 1N4

Development and Construct Validation of a Group Administered Test of Piaget's Formal Operational Period

John R. Staver
Dorothy L. Gabel
Indiana University
Bloomington, IN 47401
Saturday
2:00 - 4:15 Session F-4 Training Session Varley

Assessing Formal Thinking

Leaders: Anton E. Lawson
Arizona State University
Tempe, AZ 85281
and
Warren T. Wolman
University of North Carolina
Greensboro, NC 27412

Individual student interviews, group demonstration tasks, and group pencil-paper test items will be compared, contrasted and evaluated as methods of assessing the development of various aspects of formal thought. Their usefulness will be discussed in terms of ease of administration, reliability, and validity. Current research using such methods will be discussed in terms of experimental methodology and possible educational implications. Participants will learn how to use available methods and how to design and evaluate tasks of their own. Use of such tasks in terms of future research will be discussed.

CONCURRENT SESSION G

Saturday
3:15 - 4:15 Session G-1 Cognitive Development Harris

Presiding: John W. Renner
University of Oklahoma
Norman, OK 73019

A Study of a Possible Relationship Between Lowenfeld's Visual-Haptic Theory and Piaget's Developmental Theory

John W. Butzow
University of Maine
Orono, ME 04473
and
Richard M. Schlenker
Marine Maritime Academy
Castine, ME 04421
The Relationship of Moral and Cognitive Development in Two Cultures and the Implications for Science Teaching

Eileen M. Mays  
Indiana University Northwest  
Gary, IN 46408

and  
Mohammed A. Kistha  
Governors State University  
Park Forest, IL 60400

Application and Analysis of an Electronic Equivalent of Piaget's First Chemical Experiment

Frederick P. DeLuca  
Iowa State University  
Ames, IA 50011

Saturday  
3:15 - 4:15  
Session G-2 Paper Set: Cognitive Lismer Structure

Presiding: Edward L. Smith  
Michigan State University  
East Lansing, MI 48824

Limitations of Ausubel's Theory of Learning With Regard to Meaning and Cognitive Processing

Judith A. Van Kirk  
Cornell University  
Ithaca, NY 14853

Measuring Cognitive Structure

James H. Stewart  
Michigan State University  
East Lansing, MI 48824

Cognitive Functioning: A Model for Learning and Problem Solving

Julia A. Atkin  
University of Georgia  
Athens, GA 30602
Saturday  
3:15 - 4:15  
Session G-3  General Research  McDonald

Presiding: Victor L. Willson  
University of South Dakota  Vermillion, SD  57069

The Effects of Locus of Control and Method of Presentation on Pre-Service Teachers' Achievement

Willis J. Horak  
Kurt Slobodzian  
University of Arizona  Tucson, AZ  85721

The Effects of Process Skill Analysis on the Teaching of Data Collecting, Processing, and Interpreting

Russell H. Yeany  
James R. Okey  
William R. Capie  
University of Georgia  Athens, GA  30602

Contrasts of ISCS Achievement Groups--Levels I & II

Thomas E. McDuffie  
Saint Joseph's College  Philadelphia, PA  19131

Saturday  
3:15 - 4:15  
Session G-4  Training Session  Varley

(Continuation of Session F-4)

CONCURRENT SESSION H

Saturday  
4:30 - 5:30  
Session H-1  Critique: Teacher Behavior  Harris

Presiding: R. G. Mitias  
Ohio University  Athens, OH  45701

-20-
The Effects of Alternative Practice Methods on Science Teacher Explaining Behavior and Student Outcomes

William R. Capie
James R. Okey
Russell H. Yeany
University of Georgia
Athens, GA  30602

The Relative Effects of Modeling on the Acquisition of Wait-Time by Preservice Teachers and Concomitant Changes in Dialogue Patterns and Pupil Performance

Linda R. DeTure
Alachua County Schools
Gainesville, FL  32601

Discussant:  John T. Wilson
University of Iowa
Iowa City, IA  52242

Saturday
4:30 - 5:30  Session H-2  Instruction  Lismer

Presiding:  Burton Voss
University of Michigan
Ann Arbor, MI  48109

Development and Validation of a Televise Test of Science Processes

David E. Torrence
Moravian College
Bethlehem, PA  18018

and

Michael Szabo
Paul W. Welliver
Dennis M. Roberts
Pennsylvania State University
University Park, PA  16802
Changing Attitudes and Checking Achievement...Measuring the Effectiveness of an Interdisciplinary Approach to Science

Lorraine A. Popowicz
Anna Maria College
Paxton, MA  01612

Effects of Using Photomicrographs on Achievement and Attitude in High School Biology

William J. Dederick
Kingston City Schools
Kingston, NY  12401

and

John W. Shrum
University of Georgia
Athens, GA  30602

Saturday
4:30 - 5:30

Session H-3 Paper Set: Instruc-
McDonald

Presiding: Neil B. Sendelbach
Michigan State University
East Lansing, MI  48824

A Comparative Laboratory Study of the Effects of Two Teaching Strategies on Students' Achievement Motivation, Problem Solving Ability, and Selected Classroom Behaviors

Charles C. Matthews
Florida State University
Tallahassee, FL  32306

A Comparative Laboratory Study of Problem-Solving Ability and Confidence for Sixth Grade Science Students Exposed to Two Contrasting Teaching Strategies

David J. McKee
City of Tallahassee
Tallahassee, FL  32303
A Comparative Study of the Relationships Between Classroom Behavior and Cognitive Characteristics of Students Exposed to Two Science Teaching Strategies

Dorothy Schlitt
Florida State University
Tallahassee, FL 32306

A Comparative Study of the Effects of Two Teaching Strategies in Science on Students' Need-Affiliation and Teacher Dependency Behaviors

Jose L. Vinelli
Florida Department of Education
Tallahassee, FL 32301

A Comparative Laboratory Study of the Effects of Two Teaching Strategies on Students' Attitudes and Self-Concepts in Science

Sudhir B. Abhyankar
Florida State University
Tallahassee, FL 32306

Saturday
4:30 - 5:30
Session H-4 Paper Set: Cognitive Development

Presiding: Larry D. Yore
University of Victoria
Victoria, British Columbia, Canada
(on leave 1977-78 at the University of Iowa)

Effects of Taking Science on Formal Logical Reasoning Abilities

Richard J. Bady
Rutgers University
New Brunswick, NJ 08904

-23-
Cognitive Level and its Relationship to Aptitude, Achievement, and Training

George J. Pallrand
Rutgers University
New Brunswick, NJ 08904

Cognitive Development in Science Oriented Students

Robert N. Braun
Rutgers University
New Brunswick, NJ 08904

Saturday
5:30 - 6:30 SOCIAL HOUR Toronto II

A Sherry Hour hosted by the Ontario Institute for Studies in Education

CONCURRENT SESSION I

Saturday
8:00 - 9:30 INTERNATIONAL MEETING Harris/McDonald

Presiding: J. W. George Ivany
Simon Fraser University
Burnaby, British Columbia, Canada V5A 1S6

Open meeting for all members interested in discussing matters of mutual concern.

Saturday
8:00 - 9:30 RESEARCHERS POTPOURRI Lismer

Presiding: Arthur White
Ohio State University
Columbus, OH 43210

This open and unstructured time is provided for researchers with a common focus, from similar institutions, or a certain geographical area to plan or discuss research projects. Assemble your own group and make your own agenda.
Sunday
7:30 - 10:30
EXECUTIVE BOARD MEETING
University

Presiding: James R. Okey
University of Georgia
Athens, GA 30602

CONCURRENT SESSION J

Sunday
9:00 - 10:30
Session J-1 Instruction
Harris

Presiding: Judy C. Egelston-Dodd
National Technical Institute
for the Deaf
Rochester, NY 14623

Factors Influencing Elementary School Student Teachers' Self Concerns

Claude H. Cunningham
Houston Independent School District
Houston, TX 70027

and

Jacob W. Blankenship
University of Houston
Houston, TX 77004

An Interventionist Strategy for Changing Teacher Behavior Based on Schwab's Levels of Openness

Marvin F. Wideen
David Hopkins
Simon Fraser University
Burnaby, British Columbia, Canada V5A 1S6

Effects of Activity Sequencing on the Acquisition of the Controlling Variables Schema

Jane B. Bowyer
Mills College
Oakland, CA 94613

and

Marcia C. Linn
Stanford University
Stanford, CA 94305
The Effect of Selected Analogies on Understanding of Scientific Explanations

N. Leonard Drugge
Vancouver School System
North Vancouver, British Columbia, Canada V7R 2K6

and

Heidi Kass
University of Alberta
Edmonton, Alberta, Canada T6G 2G5

Sunday
9:00 - 10:30  Session J-2  Paper Set: Relating Lismer Research and Practice

Presiding: Douglas A. Roberts
Ontario Institute for Studies in Education
Toronto, Ontario, Canada M5S 1V6

Piagetian Research in Science Education: Some Misgivings About its Potential to Improve Practice

Hugh Munby
Queen's University
Kingston, Ontario, Canada K7L 3N6

Conceptual Analysis: A Needed Dimension for Evaluating Science Curriculum Materials

Santos Mahung
Ontario Institute for Studies in Education
Toronto, Ontario, Canada M5S 1V6

Determining Objectives Through Inquiry: A Critique of its Logical Basis

Graham W. F. Orpwood
Ontario Institute for Studies in Education
Toronto, Ontario, Canada M5S 1V6
Second Thoughts About the Potential Influence of Science Teacher Education Research

Thomas L. Russell
Queen's University
Kingston, Ontario, Canada  K7L 3N6

Classroom Observation in Science Education: The Potential of Ethnographic Research for Improving Practice

Brent S. Kilbourn
Ontario Institute for Studies in Education
Toronto, Ontario, Canada  M5S 1V6

Some Basic Questions About the Relationship of Knowledge to Action: Science Curriculum Development as a Case Study

Douglas A. Roberts
Ontario Institute for Studies in Education
Toronto, Ontario, Canada  M5S 1V6

Sunday
9:00 - 10:30  Session J-3  General Research  McDonald

Presiding: David W. R. Hopkins
Simon Fraser University
Burnaby, British Columbia, Canada  V5A 1S6

Quantitative Indices for Cognitive Structures

Michael Duffy
Lloyd Bond
University of Pittsburgh
Pittsburgh, PA  15213

The Development and Validation of a Diagnostic Test of Metric Skills

Richard L. Williams
University of Victoria
Victoria, British Columbia, Canada  V8W 2Y2
Development of the Image of Science and Scientists Scale: Classical and Rasch Model Approaches

Jeffrey K. Smith
Joseph G. Krajkovich
Rutgers University
New Brunswick, NJ 08904

Attitude Formation in Introductory Science Courses: An Application of Dissonance Theory

Frank E. Crawley
University of Texas
Austin, TX 78712

Sunday
9:00 - 10:30
Session J-4 Curriculum Development and Evaluation

Varley

Presiding: Carl Naegele
Michigan State University
East Lansing, MI 48824

An Achievement and Attitudinal Comparison of an Elective Mini-Course Science Curriculum and a Conventional Non-Elective Science Curriculum at the Junior High School Level

Ronald E. Davies
H. Seymour Fowler
Pennsylvania State University
University Park, PA 16802

An Analysis of Laboratory Activities in Two Modern Science Curricula: Project Physics and PSSC

Vincent N. Lunetta
University of Iowa
Iowa City, IA 52242

and

Pinchas Tamir
Hebrew University
Jerusalem, Israel
Science Curriculum Selection Criteria as Discriminated by Decision Makers, Change Agents, and Curriculum Developers/Publishers

Brenda Mengel Johnson
University of South Dakota
Vermillion, SD  57069

Using Qualitative Data in Formative Evaluation

Glen S. Aikenhead
University of Saskatchewan
Saskatoon, Saskatchewan, Canada  S7N 0W0

Sunday
10:45 - 11:45  GENERAL SESSION II  Toronto II

Presiding:  James R. Okey
           University of Georgia
           Athens, GA  30602

Speaker:  NSF's New Direction in Science
           Education Research
           F. James Rutherford (or a person designated by him)
           National Science Foundation
           Washington, DC  20550
Foreign Conventions*

Deductions for attending foreign conventions have been curtailed. The deduction of expenses for conventions, seminars, or similar meetings beginning after December 31, 1976, and held outside the United States, its possessions, and the Trust Territory of the Pacific, to the extent otherwise allowable, will be limited to certain expenses incurred in attending no more than two such conventions a year. The portion of the total days of the trip devoted to business-related activities and the number of hours of business activities scheduled and attended each day also will limit the deduction. The allowable expenses of attending a foreign convention must be substantiated, as explained later under Record-keeping Rules. In addition, these expenses must be substantiated by a written statement, signed by the person who attended the convention, that shows the total days spent at the convention, the number of hours each day devoted to scheduled business activities, and a program of the scheduled business activities of the convention. A written statement also is required, signed by an officer of the group sponsoring the convention, that includes a schedule of the business activities for each day of the convention and the number of hours the participant attended these scheduled business activities. Additional information may be required to support the deduction.

See the form on the following page to be completed by you and one of the NARST officers.

*Taken from IRS Publication #463—Travel, Entertainment, and Gift Expenses.
### Participants' Hours

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Activity Details</th>
<th>Total Hours Scheduled</th>
<th>Total Hours Attended by Participant</th>
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</thead>
<tbody>
<tr>
<td>Friday, March 31</td>
<td>1:00-7:00 p.m.</td>
<td>A general session, 4 1/2 hours of contributed papers, meetings, and training sessions.</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Saturday, April 1</td>
<td>7:00 a.m.-9:30 p.m.</td>
<td>Committee meetings, journal board meetings, contributed papers, a business meeting, and training sessions are scheduled throughout the day.</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Sunday, April 2</td>
<td>7:30 a.m.-12:00 noon</td>
<td>Board meetings, contributed papers, and a general session are scheduled.</td>
<td>4 1/2</td>
<td></td>
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</table>

## Signatures

<table>
<thead>
<tr>
<th>Participant</th>
<th>NARST Officer</th>
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<tbody>
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THE NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING

THE NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING (NARST) was founded for the purpose of promoting research in science education at all educational levels, and for disseminating the findings of this research in such ways as to improve science teaching. NARST is incorporated as a non-profit corporation in the state of Minnesota. The official publication of the Association is the JOURNAL OF RESEARCH IN SCIENCE TEACHING. The major areas of concern are experimental and analytical research studies (theoretical or applied) encompassing curriculum development and organization, evaluation, learning theory, teacher education, programs for the talented and underachievers, and methods of instruction in sciences. Surveys of current practices, enrollment, and course offerings represent other interests.

NARST meets with the American Education Research Association one year and the National Science Teachers Association the next year. At these meetings research papers in the areas listed above are presented along with symposia on topics of interest to teachers and educational research workers.

NARST cooperates with the ERIC Science, Mathematics, and Environmental Education Information Analysis Center (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 NARST specifies that membership shall be drawn from those active in research in science education and those outstanding in science educational leadership such as teachers, supervisors and curriculum developers. Patron membership is available to individuals and organizations who would like to contribute more than the basic dues to support the work of our organization.

The Association maintains a Placement Information Service which, each year, provides lists of positions available and of personnel seeking employment. Prospective employees and employers are urged to use these lists to arrange contacts and interview. Placement information is made available by mail early in each calendar year and at the annual meeting. Applications for membership, payment of dues, and correspondence related to the business operations of NARST should be mailed to the Executive Secretary.
This listing of program format and the following definitions are offered to clarify the structure of this program. In addition, all members are invited to make specific suggestions for modification of format or inclusion of topics in future meetings. Letters to the officers are always a welcomed means of communicating suggestions.

1. GENERAL SESSIONS--Researchers of national prominence are asked to address the NARST membership concerning topics and issues of general concern. Such analyses of where we have been and where we are going are features of the annual meeting each year.

2. CONTRIBUTED PAPERS--Individual members share results of their research efforts with other members. A series of concurrent sessions where such Contributed Papers are scheduled represent a major part of the NARST meetings. Generally such papers are restricted to a fifteen-to-twenty minute presentation which includes audience questioning as well.

3. PAPER SETS--Several related studies originating from a common research center or line of research can be structured as a set of from three to six separate but related reports. Such a grouping of paper often allows for common elements of design or approach to be presented once instead of several times.

4. SYMPOSIA AND PANELS--Areas of current research or research needs are identified and papers prepared addressing defined issues. Persons with varying backgrounds, positions, and research interests are included. In addition to presentations concerning research in a given area, interaction among the presentors, other discussants, and the audience is anticipated. Varying views, approaches, data reports, and data interpretation are desired features for these sessions.

5. TRAINING SESSIONS--These sessions are devoted to topics of basic importance for conducting disciplined inquiry of particular types. They are to contain a thorough and sophisticated treatment of a research methodology, including training in the basic procedures to be used.
According to the NARST By-Laws, the Program Committee is a Standing Committee consisting of the Research Coordinator, the President-Elect (as chairman of the Committee), and four members (each with rotating two-year terms). This program Committee is charged with planning the program format for the Annual Meeting. This planning includes preparing the Call for Papers, evaluating the contributions suggested by the members for all program elements, and preparing the program copy for distribution to members.

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

Members of the Program Committee read and rate each paper submitted for possible use on the program. Following this independent rating, the Committee meets as a group. The separate ratings are summarized and any disagreement among the Committee members making the ratings are then discussed thoroughly. All papers are eventually recommended for inclusion in the program structure or rejected. Sometimes the final decision regarding borderline situations is made based upon the program structure (i.e., number of papers within a particular classification, total number of concurrent sessions planned, needed balance in terms of topics). The names of contributors remain unknown to all persons making ratings until all decisions are made. The names of persons submitting Training Session, Symposium, and Panel proposals are discussed before final decisions are made.