

NATIONAL ASSOCIATION  
FOR RESEARCH  
IN SCIENCE TEACHING

narst

1978 NARST Annual  
Meeting Program

Toronto, Canada  
Hotel Toronto  
March 31 - April 2

## TABLE OF CONTENTS

SECTION	PAGE
Program Committee . . . . .	ii
Local Arrangements Committee . . . . .	ii
Future Meetings of NARST . . . . .	ii
Registration Information . . . . .	iii
Placement Service . . . . .	iii
NARST Officers and Board Members . . . . .	iv
Presidents of NARST . . . . .	v
Patron and Sustaining Members . . . . .	v
Program Activities	
Friday . . . . .	1-9
Saturday . . . . .	10-24
Sunday . . . . .	25-29
Schedule Planning Guide . . . . .	Center of Program
Hotel Toronto Floor Plan . . . . .	30
IRS Regulations . . . . .	31
IRS Form . . . . .	32
NARST Description . . . . .	33
NARST Program Structure . . . . .	34
Planning NARST Programs . . . . .	35

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

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

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

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

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

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

PRESIDENTS OF NARST

1928	W. L. Eikenberry	1953	J. Darrell Barnard
1929	W. L. Eikenberry	1954	George C. Mallinson
1930	W. L. Eikenberry	1955	Kenneth E. Anderson
1931	Elliot R. Downing	1956	W. C. Van Deventer
1932	Elliot R. Downing	1957	Waldo W. Blanchet
1933	Francis D. Curtis	1958	Nathan S. Washton
1934	Ralph K. Watkins	1959	Thomas P. Fraser
1935	Archer W. Hurd	1960	Vaden W. Miles
1936	Gerald S. Craig	1961	Clarence H. Boeck
1937	Walter G. Whitman	1962	Herbert A. Smith
1938	Honor A. Webb	1963	Ellsworth S. Obourn
1939	Ralph Powers	1964	Cyrus W. Barnes
1940	Otis W. Caldwell	1965	Frederic B. Dutton
1941	Harry A. Carpenter	1966	Milton O. Pella
1942	G. P. Cahoon	1967	H. Craig Sipe
1943	Florence G. Billig	1968	John M. Mason
1944	Florence G. Billig	1969	Joseph D. Novak
1945	Florence G. Billig	1970	Willard J. Jacobson
1946	C. L. Thiele	1971	Paul D. Hurd
1947	Earl R. Glenn	1972	Frank X. Sutman
1948	Ira C. Davis	1973	J. David Lockard
1949	Joe Young West	1974	Wayne W. Welch
1950	N. Eldred Bingham	1975	Robert E. Yager
1951	Betty Lockwood	1976	Ronald D. Anderson
1952	Betty Lockwood	1977	O. 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



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 Behaviors Varley

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 Methodology Harris

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  
Thinking

Lismer

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

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  
Theory

McDonald

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 16412

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



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. Zicarelli  
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 Nummendam  
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. Nieves-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

## NOTES

NARST 51st ANNUAL MEETING  
 Toronto, Canada  
 Schedule Planning Guide

FRIDAY March 31	SESSION	7:00-12:00	BOARD MEETING			
		1:00- 2:15	GENERAL SESSION I			
		A 2:30- 3:30	A-1	A-2	A-3	A-4
		B 3:45- 4:45	B-1	B-2	B-3	B-4 TRAINING SESSION
		C 5:00- 6:00	C-1	C-2	C-3	
		6:00- 7:00	SOCIAL HOUR			
SATURDAY April 1	SESSION	7:00- 8:15	EDITORIAL BOARD BREAKFAST		COMMITTEE MEETINGS	
		D 8:30- 9:30	D-1	D-2	D-3 TRAINING SESSION	D-4 TRAINING SESSION
		E 9:45-10:45	E-1	E-2		
		11:00-11:45	ANNUAL BUSINESS MEETING			
		12:00- 1:45	ANNUAL LUNCHEON			
		F 2:00- 3:00	F-1	F-2	F-3	F-4 TRAINING SESSION
		G 3:15- 4:15	G-1	G-2	G-3	
		H 4:30- 5:30	H-1	H-2	H-3	H-4
		5:30- 6:30	SOCIAL HOUR			
		I 8:00- 9:30	INTERNATIONAL MEETING		RESEARCHERS POTPOURRI	
SUNDAY April 2	SESSION	7:30-10:30	BOARD MEETING			
		J 9:00-10:30	J-1	J-2	J-3	J-4
		10:45-11:45	GENERAL SESSION II			

## NOTES

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

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



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 Televised 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  
tion

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 Varley

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

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. Krajcovich  
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 Develop-  
ment 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

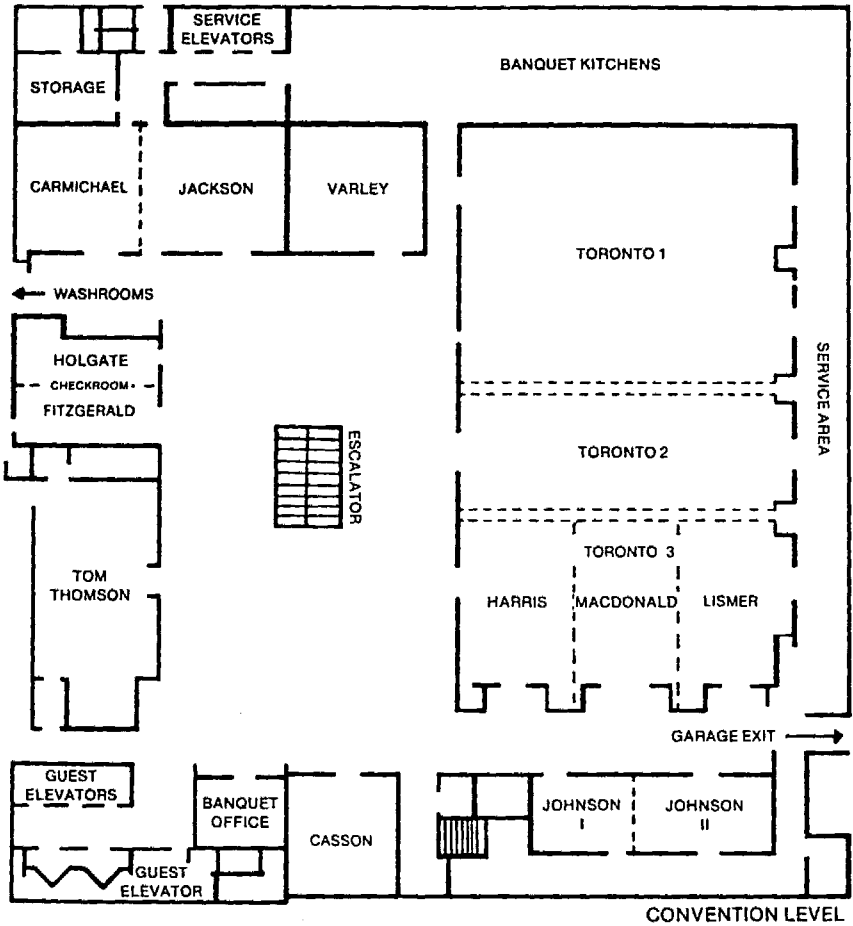
Toronto II

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

# Hotel Toronto

## FLOOR PLAN



INTERNAL REVENUE SERVICE--DEDUCTIONS FOR FOREIGN TRAVEL

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.

51st Annual Meeting  
 National Association for Research in Science Teaching  
 Hotel Toronto, Toronto, Canada  
 March 31-April 2, 1978

	Total hours sessions were scheduled	Hours attended by participant
Friday, March 31 1:00-7:00 p.m. A general session, 4 1/2 hours of contributed papers, meetings, and training sessions.	<u>6</u>	<u>        </u>
Saturday, April 1 7:00 a.m.-9:30 p.m. Committee meetings, journal board meetings, contributed papers, a business meeting, and training sessions are scheduled through- out the day.	<u>13</u>	<u>        </u>
Sunday, April 2 7:30 a.m.-12:00 noon Board meetings, contributed papers, and a general session are scheduled.	<u>4½</u>	<u>        </u>

Signatures

\_\_\_\_\_  
Participant

\_\_\_\_\_  
NARST Officer

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.

## NARST PROGRAM STRUCTURE

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.

## PLANNING NARST PROGRAMS

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.

**NATIONAL ASSOCIATION  
FOR RESEARCH  
IN SCIENCE TEACHING**

**DEPARTMENT OF SCIENCE EDUCATION  
UNIVERSITY OF GEORGIA  
ATHENS, GA. 30602**

Non-Profit Org.  
U. S. Postage  
**PAID**  
Athens, Ga.  
Permit no. 165