

NATIONAL  
ASSOCIATION  
FOR RESEARCH  
IN SCIENCE  
TEACHING

**50th  
anniversary  
meeting**

THE NETHERLAND HILTON HOTEL  
CINCINNATI, OHIO  
MARCH 22-24, 1977

SLH 1507  
RSL 2121  
DO 2527

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 concurrently with the American Education Research Association one year, and on days just previous to the National Science Teachers Association meetings 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 current NARST Research Coordinator is Associate Director for Science Education at the Center.

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.

## PROGRAM COMMITTEE

Roger G. Olstad, Chairman	University of Washington
Carl F. Berger	University of Michigan
Stanley L. Helgeson	Ohio State University
John J. Koran	University of Florida
Laura C. Trout	Indiana University
Russell Yeany, Jr.	University of Georgia

## LOCAL ARRANGEMENTS COMMITTEE

Ted W. Fowler, Co-Chairman	University of Cincinnati
Glenn C. Markle, Co-Chairman	University of Cincinnati
George Roger Courts	University of Cincinnati
Linda S. Fowler	University of Cincinnati
Frederick D. Williams	University of Cincinnati

## FUTURE MEETINGS OF NARST

1978	With AERA	Toronto
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 fourth floor foyer of the Netherland Hilton Hotel. 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 is \$20.00 which includes a banquet ticket to the annual luncheon. The annual luncheon program contains the presentation of the annual JRST award, the Patron's Award for proposed research and a special program planned in honor of our 50th Anniversary Meeting.

## 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. In addition, a limited number of copies of an updated NARST PLACEMENT INFORMATION BULLETIN will be available. 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

1976-1977

PRESIDENT

O. Roger Anderson  
Teachers College - Columbia University  
New York, New York

PRESIDENT ELECT

Roger G. Olstad  
University of Washington  
Seattle, Washington

IMMEDIATE PAST PRESIDENT

Ronald D. Anderson  
University of Colorado  
Boulder, Colorado

EXECUTIVE SECRETARY

Paul Joslin  
Drake University  
Des Moines, Iowa

RESEARCH COORDINATOR

Stanley L. Helgeson  
Ohio State University  
Columbus, Ohio

EDITOR, JOURNAL OF RESEARCH IN SCIENCE TEACHING

David P. Butts  
University of Georgia  
Athens, Georgia

BOARD MEMBERS

Betsy Ann Balzano (1977)  
State University College  
Brockport, New York

J. W. George Ivany (1979)  
Memorial University  
St. Johns, Newfoundland, Canada

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

James R. Okey (1977)  
University of Georgia  
Athens, Georgia

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

Ronald J. Raven (1974)  
State University of New York  
Amherst, New York

## 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

## 1976 PATRON MEMBERS

O. Roger Anderson  
Cyrus Barnes  
Battelle Memorial Institute  
Ralph W. Lefler  
Robert E. Yager  
H. Craig Sipe

## 1976 SUSTAINING MEMBERS

Henry A. Burnett  
Donald G. Peterson  
Hans O. Andersen

FIFTIETH ANNUAL MEETING OF THE  
NATIONAL ASSOCIATION FOR RESEARCH

IN SCIENCE TEACHING

March 22-24, 1977  
Netherland Hilton Hotel  
Cincinnati, Ohio

March 22  
Tuesday  
8:00 - 5:00

REGISTRATION

Fourth Floor Foyer

Tuesday  
8:00 - 12:00

EXECUTIVE BOARD MEETING

Parlor G

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

Tuesday  
1:00 - 2:15

GENERAL SESSION ONE

Pavilion

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

"Science Teaching and Students' Images of the Future:  
Some Suggested Implications"

E. Paul Torrance  
University of Georgia  
Athens, Georgia 30602

*Torr. - New  
Images of Future -  
of the Future -  
can use instru.  
if share data  
Fut. Prob. Soling.*

Tuesday  
2:30 - 4:00  
Parlor L

CONCURRENT SESSION ONE

A. Learning Theory

Presiding: Richard D. Kellough  
California State University  
Sacramento, California

"Content Specific Cognitive Growth and General Cognitive Growth and its Relation to the Theories of David Ausubel and Jean Piaget"

Gerald S. Friedman  
Cornell University  
Ithaca, New York 14850

"The Relationship Between Cognitive Styles and One Type of Logical Reasoning"

Patricia M. Heller  
University of Michigan  
Ann Arbor, Michigan 48109

"A Comparison of Student Preferences and Actual Performance in Problem Solving Tasks within a Piagetian Setting"

David L. Dunlop  
University of Pittsburgh at Johnstown  
Johnstown, Pennsylvania 15904

and

Frank Fazio  
Indiana University of Pennsylvania  
Indiana, Pennsylvania

"The Effect of Instructional Mode on School Achievement of Concrete and Formal Operational Students"

John J. Rostovac  
California State University Long Beach  
Long Beach, California 90801

"A Study of the Relationship Between Cognitive Development and Achievement in College Physics: A Statistical Search for a Theoretical Framework"

Russell M. Agne  
University of Vermont  
Burlington, Vermont 05401

and

H. Daniel Cohen  
University of Vermont  
Burlington, Vermont 05401

Donald F. Hillman  
University of Vermont  
Burlington, Vermont 05401

Tuesday  
2:30 - 4:00  
Parlor M

B. Perceptions

Presiding: Mitchell E. Batoff  
Jersey City State College  
Jersey City, New Jersey 07305

"A Possible Explanation of Declining Test Scores or 'Learning Less Science But Enjoying It More'"

Wayne W. Welch  
University of Minnesota, Minneapolis  
(On-leave 1976-77)  
University of Washington  
Seattle, Washington 98195

"Changes In Curiosity Behavior From Childhood to Adolescence"

Rita W. Peterson  
California State University  
Hayward, California 94542

"Perceptions of Scientific Literacy"

Lawrence L. Gabel  
The Ohio State University  
Columbus, Ohio 43210

"Superstitions Among Ugandan Adolescents: Their Possible Scientific Explanations And Relation To The Science Curriculum"

Catherine D. Namuddu  
Teachers College, Columbia University  
New York, New York 10027

"A Compendium of Values Clarification Research in Environmental Education at S I U C - Kindergarten through Middle School"

Audrey N. Tomera  
Southern Illinois University  
Carbondale, Illinois 62901

Tuesday  
2:30 - 4:00  
Parlor N

C. Philosophical Analyses      Paper Set

Presiding: Paul C. Beisenherz  
University of New Orleans  
New Orleans, Louisiana 70122

"Philosophical Analysis and Science Education: A Fruitful Partnership"

"Philosophical Analysis and Science Education Research: Introduction and Recapitulation"

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

and

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

"Analyzing Science Teaching: The Quality of the Intellectual Experience and the Concept of Intellectual Independence"

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

"Analyzing Arguments for Objectives in Science Education"

Graham W. F. Orpwood  
The Ontario Institute for Studies in  
Education  
Toronto, Ontario, Canada M5S 1V6

"Applying Philosophical Analysis to Science Teaching: Strategies for Inservice Work with Teachers"

Thomas L. Russell  
The Ontario Institute for Studies in  
Education  
Ottawa, Ontario, Canada K2E 6L8

"Identifying World Views: Mechanism and Potential Consequences for Science Students"

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

Tuesday  
2:30 - 4:00  
Parlor 0

D. Curriculum Dissemination Paper Set

Presiding: Kenneth D. Moore  
University of Tulsa  
Tulsa, Oklahoma 74104

"Differences In How Elementary Science Teachers Learn To Use Their Curricula and Their Satisfaction With That Curricula"

Donald N. Nimmer  
The University of South Dakota  
Vermillion, South Dakota 57069

"The Efficacy of Part-Time Consultants to Support Curriculum Dissemination"

Jerry G. Horn  
The University of South Dakota  
Vermillion, South Dakota 57069

"The Impact of Short Term High Intensity Efforts to Disseminate Elementary Science Curricula"

Arlen R. Gullickson  
National Science Foundation  
Washington D.C.

"Dissemination of Educational Information Through Various Media Channels"

Donald N. Nimmer  
The University of South Dakota  
Vermillion, South Dakota 57069

Tuesday  
4:15 - 5:45  
Parlor L

CONCURRENT SESSION TWO

A. Testing & Achievement

Presiding: William B. McIlwaine  
Millersville State College  
Millersville, Pennsylvania 17551

"A Likert-Type Scale to Assess Attitude Toward Metric Measurement Conversion"

Robert L. Shrigley  
The Pennsylvania State University  
University Park, Pennsylvania 16802

and

Cecil R. Trueblood  
The Pennsylvania State University  
University Park, Pennsylvania 16802

"Development of a Test of Scientific Reasoning"

Cornelius J. Troost  
Brock University  
St. Catharines, Ontario, Canada

"Development of An Instrument to Measure Beliefs  
About Science Teaching"

Linda Jones  
California State University, Northridge  
Northridge, California 91330

"A Science Skills Test: Development and Field Testing"

Gerald L. Abegg  
Boston University  
Boston, Massachusetts 02215

and

Romualdas Skvarcius  
Boston University  
Boston, Massachusetts 02215

"Changes in Grade 12 Chemistry Achievement Patterns in  
Ontario after Establishment of a Modern Course of Study"

Alexander Even  
The Ontario Institute for Studies in  
Education  
Toronto, Ontario, Canada M5S 1V6

Tuesday  
4:15 - 5:45  
Parlor M

B. Piaget

Paper Set

Presiding: F. David Boulanger  
University of Illinois at  
Chicago Circle  
Chicago, Illinois 60680

"Piagetian Schema and Formal Thought"

George J. Pallrand  
Rutgers University  
New Brunswick, New Jersey 08903

"The Development of Correlational Reasoning and Hypothesis Testing Ability"

Richard J. Bady  
Rutgers University  
New Brunswick, New Jersey 08903

"Sex Differences in Formal Reasoning"

Michael D. Piburn  
Rutgers University  
New Brunswick, New Jersey 08903

Tuesday  
4:15 - 5:45  
Parlor N

C. Systems Dynamics Training Session

Presiding: Martin L. Goodson  
Alabama A & M University  
Normal, Alabama 35811

"System Dynamics: Strategies and Materials"

Nancy H. Roberts  
M.I.T., Sloan School  
Cambridge, Massachusetts

Tuesday  
4:15 - 5:45  
Parlor O

D. Science Enrollments Symposium

Presiding: Ronald D. Anderson  
University of Colorado  
Boulder, Colorado 80309

"Uninformative Enrollment Data"

Panel Discussion

Chairman	Fletcher G. Watson Harvard University Cambridge, Massachusetts 02138
Biology	James T. Robinson Biological Sciences Curriculum Study Boulder, Colorado 80302
Chemistry	John Schaff University of Toledo Toledo, Ohio
Junior High School	Ernest Burkman Florida State University Tallahassee, Florida
Earth Science	Victor J. Mayer Ohio State University Columbus, Ohio 43210
Physics	Fletcher G. Watson Harvard University Cambridge, Massachusetts 02138
Publisher	Nicholas Moore Holt, Rinehart & Winston
National Center for Educational Statistics	Logan C. Osterndorf Dept. of HEW Washington, D.C. 20202

Open Discussion

Tuesday  
7:30 - 9:00  
Parlor H

OPEN MEETING OF INTERNATIONAL MEMBERS

International members and others interested are invited to meet to discuss matters of mutual concern.

Presiding: George Ivany  
Memorial University  
St. Johns, Newfoundland, Canada

March 23  
Wednesday  
8:00 - 5:00

REGISTRATION Fourth Floor Foyer

Wednesday  
8:30 - 9:30  
Parlor L

CONCURRENT SESSION THREE

A. Curriculum

Presiding: Harold R. Hungerford  
Southern Illinois University  
Carbondale, Illinois 62901

"Cognitive Preferences in Biology of Students Participating in a Secondary Science Training Summer Program"

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

and

Pinchas Tamir  
Hebrew University  
Jerusalem, Israel

"The Development and Implementation of the Levels of Use Observational Inventory (LoUOI): An Instrument to Aid in the Adoption of an Innovation Process"

Joel A. Colbert  
University of Kansas  
Lawrence, Kansas 66044

"Does More Time Yield More Learning?"

John T. Wilson  
University of Iowa  
Iowa City, Iowa 52242

Wednesday  
8:30 - 9:30  
Parlor M

B. General Research

Presiding: Martha K. Piper  
University of Houston  
Houston, Texas 77004

"The Philosophic Consistency of Science Teachers'  
Opinions About the Structure of Scientific Laws and  
Theories"

Ronald E. Rowe  
Beaver College  
Glenside, Pennsylvania 19038

"Cognitive Dissonance as a Means of Effecting Changes  
in School Related Attitudes"

Robert L. Steiner  
The Ohio State University  
Columbus, Ohio 43210

"The Acquisition of the Conservation of Number by  
Preschool Children Using Didactic and Alternative  
Example Methods of Instruction to Examine Aptitude  
X Treatment Interaction"

Albert W. Strickland, III  
Indiana University  
Bloomington, Indiana 47401

"The Relative Effectiveness of Teacher versus Administrators Curriculum Conferences as Agents of Change"

Euwe van den Berg  
University of Iowa  
Iowa City, Iowa 52242

and

John T. Wilson  
University of Iowa  
Iowa City, Iowa 52242

Wednesday  
8:30 - 9:30  
Parlor N

C. Complex Scientific Problem Solving  
Paper Set

Presiding: Joy S. Lindbeck  
University of Akron  
Akron, Ohio 44313

"The Wooley Mammoth as a Computer-Based Complex Problem-Solving Tool"

Michael Szabo  
The Pennsylvania State University  
University Park, Pennsylvania 16802

"A Multiple Discriminant Analysis Study of Scientific Problem-Solving Ability in a Computer-Based Learning Environment"

Thomas Rhoades  
Anne Arundel County Schools  
Annapolis, Maryland 21401

"A Comparison of Individual and Dyadic Performance on a Computer-Based Science Problem-Solving Task as a Function of Mental Ability"

Melissa Berkowitz  
The Pennsylvania State University  
University Park, Pennsylvania 16802

Wednesday  
8:30 - 9:30  
Parlor 0

D. Ausubel-Piaget Models Symposium

Presiding: Joseph D. Novak  
Cornell University  
Ithaca, New York 14853

"Ausubelian and Piagetian Models for Science Education  
Research"

Participants:

Anthony Lawson  
University of California  
Berkeley, California

Ronald Raven  
State University of New York  
Amherst, New York 14260

Warren Wollman  
University of North Carolina  
Greensboro, North Carolina

Joseph D. Novak  
Cornell University  
Ithaca, New York 14853

Wednesday  
9:45 - 10:45  
Parlor L

CONCURRENT SESSION FOUR

A. Instruction

Presiding: Michael J. Padilla  
University of Victoria  
Victoria, B.C., Canada

"Differential Learning Effects of Varied Numbers of  
Instructive Questions"

William G. Holliday  
University of Calgary  
Calgary, Alberta, Canada

"Effects of a Compensatory Reading Version of ISCS  
Level III Instructional Materials on Science Achieve-  
ment"

Charles E. Greene  
Fitchburg Public Schools  
Fitchburg, Massachusetts 01420

and

Michael Szabo  
The Pennsylvania State University  
University Park, Pennsylvania

Lester Golub  
The Pennsylvania State University  
University Park, Pennsylvania

"The Effect of Intensive Instruction in Hypothesis  
Generation Upon Hypothesis Forming and Questioning  
Behaviors of Ninth Grade Students"

Chris A. Poulter  
Prince George's County Public Schools  
Hyattsville, Maryland 20782

and

Emmett Wright  
University of Maryland  
College Park, Maryland

"Predictions of Achievement and Success in ISCS -  
Level II"

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

Wednesday  
9:45 - 10:45  
Parlor M

B. Classroom Environment      Symposium

Presiding: Marcia C. Linn  
University of California  
Berkeley, California 94720

"A Free Choice Environment: Advantages in the Classroom"

Marcia C. Linn  
University of California  
Berkeley, California 94720

and

Herbert D. Thier  
University of California  
Berkeley, California 94720

Warren Wollman  
University of North Carolina  
Greensboro, North Carolina 27412

Jane B. Bowyer  
Mills College  
Oakland, California 94613

Benjamin Chen  
Ben Gurion University  
Israel

Wednesday  
9:45 - 10:45  
Parlor N

C. Teacher Control

Paper Set

Presiding: James R. Campbell  
St. John's University  
Jamica, New York 11439

"An Experimental Study of Teacher Control in Sixth Grade Science Classes"

I. "Background and Experimental Design"

Robert K. Crocker  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

and

Roda P. Amaria

Glenn W. Clark

II. "Science Process Achievement"

Roda P. Amaria  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

and

Helen Banfield  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

Robert K. Crocker

III. "Pupil Preferences"

Douglas B. Sheppard  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

and

Robert K. Crocker

Roda P. Amaria

IV. "Pupil Perceptions"

Glenn W. Clark  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

and

Gary Rumboldt  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

Robert K. Crocker

V. "Summary Discussion"

Robert K. Crocker  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

Wednesday  
9:45 - 10:45  
Parlor 0

D. College Science Teaching Paper Set

Presiding: Robert J. Vanden Branden  
Drake University  
Des Moines, Iowa 50311

"A Study of Sex-bias in College Science Teaching"

Linda J. Kelsey  
University of Iowa  
Iowa City, Iowa 52242

and

Kathleen M. Filkins  
University of Iowa  
Iowa City, Iowa 52242

"A Comparative Study of Student Behavior in Upper and Lower Level Laboratories in Five Science Disciplines"

John E. Penick  
University of Iowa  
Iowa City, Iowa 52242

and

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

"The Role of Teaching Assistants in Upper and Lower Level Laboratories in Five Science Disciplines"

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

and

John E. Penick  
  
William C. Kyle  
University of Iowa  
Iowa City, Iowa 52242

"Some New Techniques in Collecting and Analyzing  
Classroom Behavior Data"

Jay D. Wortman            and John E. Penick  
University of Iowa  
Iowa City, Iowa 52242    James A. Shymansky

Wednesday  
11:00 - 11:45  
North Hall

BUSINESS MEETING

Presiding: O. Roger Anderson

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50TH ANNIVERSARY LUNCHEON

Wednesday March 23  
12:00-2:15  
Pavilion

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

Introductions

The JRST Award Presentation - Calvin W. Gale  
Chairman

The NARST Patron's Award Presentation - John T. Wilson  
Chairman

Past President's Recognition

Recognition of New and Past Officers

Recognition of Program Committee

Installation of New President

Special 50th Anniversary Program

"NARST--A GOLDEN ANNIVERSARY"

Willard J. Jacobson  
Teachers College  
Columbia University  
New York, New York

Wednesday  
2:30 - 4:00  
Parlor L

CONCURRENT SESSION FIVE

A. Learning Factors

Presiding: Francis Lawrenz  
State University College at Buffalo  
Buffalo, New York  
(On-leave 1977-78)  
National Science Foundation  
Washington, D.C.

"A Study of Risk Taking Characteristics of Learners and  
Science Achievement Resulting From Alternative Methods  
of Instruction"

Larry F. Guthrie  
Indiana University Northwest  
Gary, Indiana 46408

and

Gerald H. Gearhart  
Kouts Elementary School  
Valparaiso, Indiana 46383

"An Analysis of the Relationship of Students' Self Con-  
cepts in Science to Their Mental Abilities, Sex, and  
Measures of Achievement in Science"

Rodney L. Doran  
State University of New York  
Amherst, New York 14260

and

Burt A. Sellers  
State University of New York  
Amherst, New York 14260

"The Effectiveness of Generalizing Cues on Learning  
From Graphical Material"

Paul D. Eggen  
University of North Florida  
Jacksonville, Florida 32216

and

Donald Kauchak  
University of North Florida  
Jacksonville, Florida 32216

Sandra Kirk  
University of North Florida  
Jacksonville, Florida 32216

"An Analysis of Cognitive Style Profiles and Related  
Science Achievement Among Secondary School Students"

William R. Ogden  
East Texas State University  
Commerce, Texas 75428

and

Patricia M. Brewster  
Mesquite Independent School District  
Mesquite, Texas 75149

"An EEG Study: Hemispheric Brain Functioning of Six to  
Eight Year Old Children During Piagetian and  
Curriculum Tasks"

R. Harter Kraft  
Ohio State University  
Columbus, Ohio 43220

Wednesday  
2:30 - 4:00  
Parlor M

B. Awards Papers Presentation

Presiding: Calvin W. Gale  
Michigan Technological University  
Houghton, Michigan 44931

John T. Wilson  
University of Iowa  
Iowa City, Iowa 52242

"JRST Award Paper"

Title and Author to be Announced.

"Patron's Award Paper"

Title and Author to be Announced

Wednesday  
2:30 - 4:00  
Parlor N

C. Piaget

Paper Set

Presiding: Gerald L. Abegg  
Boston University  
Boston, Massachusetts 02215

"Piaget's Grouping Model and its Relevance to Research  
in Science Education"

Darrell G. Phillips  
University of Iowa  
Iowa City, Iowa 52242

"An Investigation of the Development of Six Topo-  
logical Piagetian Groupings in Pre-School, Kinder-  
garten, and Second Grade Children"

Herbert G. Cohen  
Arizona State University  
Tempe, Arizona 85281

"An Investigation of Piaget's Groupings: Seriation  
and Projective Space"

Gordon E. Odegaard  
Mount Vernon High School  
Mount Vernon, Washington 98273

"Six Major Logical Groupings of Concrete Operational  
Thought"

David L. Camp  
Bowman-Gray School of Medicine  
Winston-Salem, North Carolina 27103

"The Performance of Secondary School Students on  
Piaget-Type Tasks of Projective and Euclidean Space"

Carole J. Reesink  
University of Iowa  
Iowa City, Iowa 52242

Wednesday  
2:30 - 4:00  
Parlor 0

D. Teacher Preparation Symposium

Presiding: Doris Trojcak  
University of Missouri  
St. Louis, Missouri

"Measuring Effectiveness in Science Teacher Preparation Programs"

"Using Learner Performance to Measure Science Teacher Effectiveness"

James R. Okey  
University of Georgia  
Athens, Georgia 30602

William R. Zeitler  
University of Georgia  
Athens, Georgia 30602

"Evaluating Teachers Using Teacher Performance"

David P. Butts  
University of Georgia  
Athens, Georgia 30602

William R. Capie  
University of Georgia  
Athens, Georgia 30602

"Establishing Links Between Teacher Behavior and Learner Outcomes"

David H. May  
University of Georgia  
Athens, Georgia 30602

Joseph P. Riley  
University of Georgia  
Athens, Georgia 30602

"Evaluating Science Teacher Preparation Programs by Assessing Teachers and Pupils"

Russell H. Yeany, Jr.  
University of Georgia  
Athens, Georgia 30602

Reactors: Carl Berger  
University of Michigan  
Ann Arbor, Michigan

Howard L. Jones  
University of Houston  
Houston, Texas

Wednesday  
4:15 - 5:45  
Parlor L

CONCURRENT SESSION SIX

A. Historical Studies Symposium

Presiding: Willard J. Jacobson  
Teachers College  
Columbia University  
New York, New York 10027

"Historical Studies in Science Education"

Participants:

Willard J. Jacobson  
Teachers College  
Columbia University  
New York, New York 10027

Leo E. Klopfer  
University of Pittsburgh  
Pittsburgh, Pennsylvania  
15260

Roger W. Bybee  
Carleton College  
Northfield, Minnesota 55057

Alan M. McCormack  
Box 1528 Peace Arch Plaza  
Blaine, Washington 98230

Wednesday  
4:15 - 5:45  
Parlor M

B. General Research

Presiding: Frederick P. Deluca  
Iowa State University  
Ames, Iowa 50011

"The Immediate and Long Term Effect of Intensive  
Instruction Upon Basic Inquiry Skills"

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

"Language Acquisition as a Byproduct of Science  
Instruction"

Mary Ellen Quinn  
Edgewood School District  
San Antonio, Texas 78230

and

Carolyn Kessler  
University of Texas at San Antonio  
San Antonio, Texas 78230

"Psychomotor Abilities of Science and Non-Science  
High School Students"

Rodney C. Doran  
State University of New York  
Amherst, New York 14260

"The Effects of Cuing on Mathemagenic Behavior in  
a Medical Terminology Course"

Barbara B. Braverman  
National Technical Institute  
for the Deaf  
Rochester, New York 14623

and

Judy Egelston Dodd  
National Technical Institute  
for the Deaf  
Rochester, New York 14623

"The Development and Use of an Energy-Environment  
Assessment Instrument"

Frank Fazio  
Indiana University of Pennsylvania  
Indiana, Pennsylvania 15701

and

David L. Dunlop  
University of Pittsburgh at Johnstown  
Johnstown, Pennsylvania 15904

Wednesday  
4:15 - 5:45  
Parlor N

C. Teacher Education

Presiding: John P. Smith  
University of Washington  
Seattle, Washington 19895

**"An Investigation of Two Approaches for Education  
in Science of Preservice Elementary School Teachers"**

Donna L. Siemro  
Governors State University  
Park Forest South, Illinois 60466

**"Assessing the Difference of Teacher Behavior Among  
Three Elementary Science Curricula (ESS, SAPA, SCIS)"**

naihua Chang  
The University of Iowa  
Iowa City, Iowa 52240

and

John T. Wilson  
The University of Iowa  
Iowa City, Iowa 52240

**"The Effects of Instruction in Science Process Skills  
on Reading Comprehension of Pre-service and In-service  
Elementary Teachers"**

Richard L. Campbell  
Florida International University  
Miami, Florida 33125

and

Emma W. Rembert  
Florida International University  
Miami, Florida 33125

**"The Effects of Micro-Teaching on the Attitudes of  
Pre-service Elementary Teachers Toward the Teaching  
of Science"**

Steven P. Bergel  
South Country School District  
Brookhaven, New York

and

Seymour H. Fowler  
The Pennsylvania State University  
University Park, Pennsylvania

Wednesday  
4:15 - 5:45

~~Parlor 0~~

*North Hall*

D. Research Priorities Symposium

Presiding: Stanley L. Helgeson  
Ohio State University  
Columbus, Ohio 43210

"Priorities for Research in Science Education"

David P. Butts      David May  
William Capie      James Okey  
Ellen Fuller      Russell Yeany  
The University of Georgia  
Athens, Georgia 30602

"Analytical Study of the Research Priorities of  
Science Educators"

Russell Yeany      William Capie  
The University of Georgia  
Athens, Georgia 30602

"The Relationship Among Science Educators' Research  
Priorities and Demographic Variables"

Russell Yeany      James Okey  
The University of Georgia  
Athens, Georgia 30602

"Critique of Results"

Gary Bates  
Teachers College, Columbia University  
New York, New York 10027

Edward Smith  
Michigan State University  
East Lansing, Michigan 48824

Paul Koutnik  
Illinois Institute of Technology  
Chicago, Illinois 60616

Wednesday  
5:45 - 7:00                      SOCIAL HOUR                      Continental Room

March 24  
Thursday  
8:00 - 12:00                      REGISTRATION                      Fourth Floor Foyer

Thursday  
7:30 - 10:00                      EXECUTIVE BOARD MEETING                      Parlor G

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

Thursday  
9:00 - 10:30  
Parlor L                      CONCURRENT SESSION SEVEN  
A. Learning Theory: Piaget

Presiding: Marvin Druger  
Syracuse University  
Syracuse, New York 13210

"Measurement of Logical Thinking: An Electronic  
Equivalent of Piaget's First Chemical Experiment"

Frederick P. DeLuca  
Iowa State University  
Ames, Iowa 50011

"The Development and Validation of a Classroom Test of  
Formal Operations"

Anton E. Lawson  
University of California  
Berkeley, California 94720

"The Construction of an Instrument to Measure Proportional Reasoning Ability of Junior High Pupils"

Orville G. Ruud  
Bloomington Public Schools  
Bloomington, Minnesota 55431

"The Validation of Two Science-Centered Incident Batteries Which Distinguish Concrete and Formal Reasoning"

John W. Renner  
University of Oklahoma  
Norman, Oklahoma 73019

"The Role of the Proportionality Schema in Introductory High School Chemistry"

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

and

Alan E. Wheeler  
University of Alberta  
Edmonton, Alberta, Canada T6G 2G5

Thursday  
9:00 - 10:30  
Parlor M

B. Instruction

Presiding: John Butzow  
University of Maine  
Orono, Maine 04473

"An Experiment in Science Instruction with Fifth Grade Children in Spanish-English Bilingual Schools"

John R. Juarez  
University of Washington  
Seattle, Washington 98195

**"The Influence of Spatial Abilities, Aptitudes, and Attitudes on Success in Geology"**

Osborne B. Nye, Jr.  
Syracuse University  
Syracuse, New York 13210

and

Larry E. Schafer  
Syracuse University  
Syracuse, New York 13210

James C. Brower  
Syracuse University  
Syracuse, New York 13210

**"An Exploratory Study of Teacher Interventions in Elementary Science Laboratory Groups"**

Wayne F. Oakley  
Department of Education  
Province of Newfoundland  
St. John's, Newfoundland, Canada

and

Robert K. Crocker  
Memorial University of Newfoundland  
St. John's, Newfoundland, Canada

**"The Effects of Diagnostic Testing and Remediation on Science Achievement and Retention"**

Joe C. Long  
University of Georgia  
Athens, Georgia 30602

and

James R. Okey  
University of Georgia  
Athens, Georgia 30602

Russell H. Yeany, Jr.  
University of Georgia  
Athens, Georgia 30602

"Application of Bales Interpersonal Model to Science Teaching"

Gary C. Bates  
Columbia University  
New York, New York 10027

Thursday  
9:00 - 10:30  
Parlor N

C. Competency Based Teacher Education  
Paper Set

Presiding: Alan M. Voelker  
Northern Illinois University  
DeKalb, Illinois 60115

"Surveying Changes in a Competency-Based Teacher Education Program"

"Cognitive Gains Assessed by a Self-Made Instrument for a Competency-Based Teacher Education Program"

Otis Lawrence  
Governors State University  
Park Forest South, Illinois 60466

"Correlating Beliefs About Science and Science Teaching with Preferred Learning Styles"

Leon J. Zalewski  
Governors State University  
Park Forest South, Illinois 60466

"Comparison Between Elementary Science Education and Non-Science Education Majors"

Donna Siemro  
Governors State University  
Park Forest South, Illinois 60466

"The Difference Competency-Based Science Teachers  
Make: Student Variables"

Eugene Nuccio  
Governors State University  
Park Forest South, Illinois 60466

"Changes in Teacher Attitudes and Behaviors with  
Time in the Classroom"

John Hockett  
Governors State University  
Park Forest South, Illinois 60466

Thursday  
9:00 - 10:30  
Parlor 0

D. Teacher Education Paper Set

Presiding: Barbara Strawitz  
Louisiana State University  
Baton Rouge, Louisiana

and

James P. Barufaldi  
University of Texas  
Austin, Texas 78712

"Attitudinal Changes and Open-Mindedness of Pre-  
service Elementary Teachers Following a Science Methods  
Course"

Martha K. Piper  
University of Houston  
Houston, Texas 77004

and

Linda Hough  
University of Houston  
Houston, Texas 77004

"The Effects of an Elementary Science Methods Course  
on the Attitudes of Preservice Teachers Toward Science"

Lowell J. Bethel  
University of Texas  
Austin, Texas 78712

and

Martha Piper  
The University of Houston  
Houston, Texas 77004

William G. Lamb  
Delta State University  
Cleveland, Mississippi 38733

"The Effects of Methods Course Components on Elementary  
Education Majors: Replication and Extension"

William G. Lamb  
Delta State University  
Cleveland, Mississippi 38733

and

Martha Piper  
The University of Houston  
Houston, Texas 77004

Lowell J. Bethel  
University of Texas  
Austin, Texas 77025

Thursday  
10:45 - 12:00

GENERAL SESSION TWO

Pavilion

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

"Science and Fate Control"

Mary Budd Rowe  
University of Florida  
Gainesville, Florida 32601

Thursday  
1:30 - 3:00

~~Room 602~~

*North Hall*

CONCURRENT SESSION EIGHT

A. Teacher Education

Presiding: Ellen S. Simmons  
Teachers College  
Columbia University  
New York, New York 10027

"Relationships Between Science Teacher Needs and Selected Teacher Variables"

Kenneth D. Moore  
The University of Tulsa  
Tulsa, Oklahoma 74104

"Needed Secondary School Science Teacher Attributes: A Synthesis from the Views of Science Teachers, Science Supervisors, and Science Educators"

Eugene L. Chiappetta  
University of Houston  
Houston, Texas 77004

and

Alfred T. Collette  
Syracuse University  
Syracuse, New York 13210

"Attitude Changes of Teachers Trained and Selected as Model Science Teachers"

Dorothy L. Gabel  
Indiana University  
Bloomington, Indiana 47401

"The Effects of Studying a Question Classification System on the Cognitive Level of Preservice Teachers' Questions"

Joseph P. Riley  
University of Georgia  
Athens, Georgia 30602

"Estimation of the Reliability and Validity of Rating  
Science Teacher Behaviors"

Masood S. Ashrafi  
University of Iowa  
Iowa City, Iowa 52242

and

John T. Wilson  
University of Iowa  
Iowa City, Iowa 52242

Thursday  
1:30 - 3:00  
~~Room 615~~

*Julep Room  
3rd Fl.*

B. Journal of Research in Science Teaching  
Editorial Board Meeting (open to all  
registered conference members)

Presiding: David P. Butts  
University of Georgia  
Athens, Georgia 30602

Thursday  
p.m.

Association for the Education of Teachers  
in Science has several sessions in their  
program planned for this afternoon of  
special interest to NARST members. Please  
consult the AETS program for details.

March 25  
Friday

In conjunction with other science edu-  
cation organizations, several joint sess-  
ions have been arranged for your interest.

Friday  
8:00 - 9:00  
227 Convention  
Center

Joint NARST/AETS Session

Presiding: Jacob W. Blankenship  
University of Houston  
Houston, Texas

"A Consideration of the Ethical Implications of  
Questions Asked in Science Teacher Education  
Research"

Ronald D. Anderson  
University of Colorado  
Boulder, Colorado 80309

and

J. W. George Ivany  
Memorial University  
St. Johns, Newfoundland, Canada

Friday  
10:45 - 12:00  
210 - 212  
Convention  
Center

Joint NARST/NSTA Session

Presiding: Sylvia K. Shugrue  
District of Columbia  
Public Schools  
Washington, D.C.

Ellsworth Scott Obourn Memorial Lecture

B. F. Skinner  
Harvard University  
Cambridge, Massachusetts 02138

Friday  
3:00 - 5:00  
201 Convention  
Center

Joint NARST/AETS/NSSA/CS<sup>3</sup> Session

Presiding: Ertle Thompson  
University of Virginia  
Charlottesville, Virginia 22803

"Who Speaks for Science Education?"

Marjorie H. Gardner  
University of Maryland  
College Park, Maryland 20742

and

Robert W. Howe  
Ohio State University  
Columbus, Ohio 43210

Douglas S. Reynolds  
State Education Department of New York  
Albany, New York 12224

James R. Wailes  
University of Colorado  
Boulder, Colorado 80309

Reactors: F. James Rutherford  
New York University  
New York, New York 10003

N. S. F. Representative unidentified  
at this time.

## 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, in particular the president-elect, 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 - Many individual members are anxious to share results of their individual research efforts with other members. A series of concurrent sessions where such Contributed Papers can be 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. A Paper Set grouping can also allow for a division of a single report which represents a major research development in terms of time, number of workers, and/or geography.
4. SYMPOSIA - Areas of current research or research needs are identified and papers prepared addressing defined issues. Symposia include persons with varying backgrounds, positions, and research interests. In addition to presentations concerning research in a given area, interaction among the symposium presentors, other discussants, and the audience is anticipated. Varying views, approaches, data reports, and data interpretation are desired features for Symposia.
5. PANELS - There are many debatable issues in science education. Panels are frequently constituted as a result of positions taken by members. Such Panels provide a mechanism for debating issues and involving interested members in such discussions of views.

6. INFORMAL DISCUSSION - Time is scheduled in the program for members to meet with one another concerning topics of interest. One important function of such sessions is the opportunity for members interested in new positions to confer with NARST members from institutions with faculty vacancies.

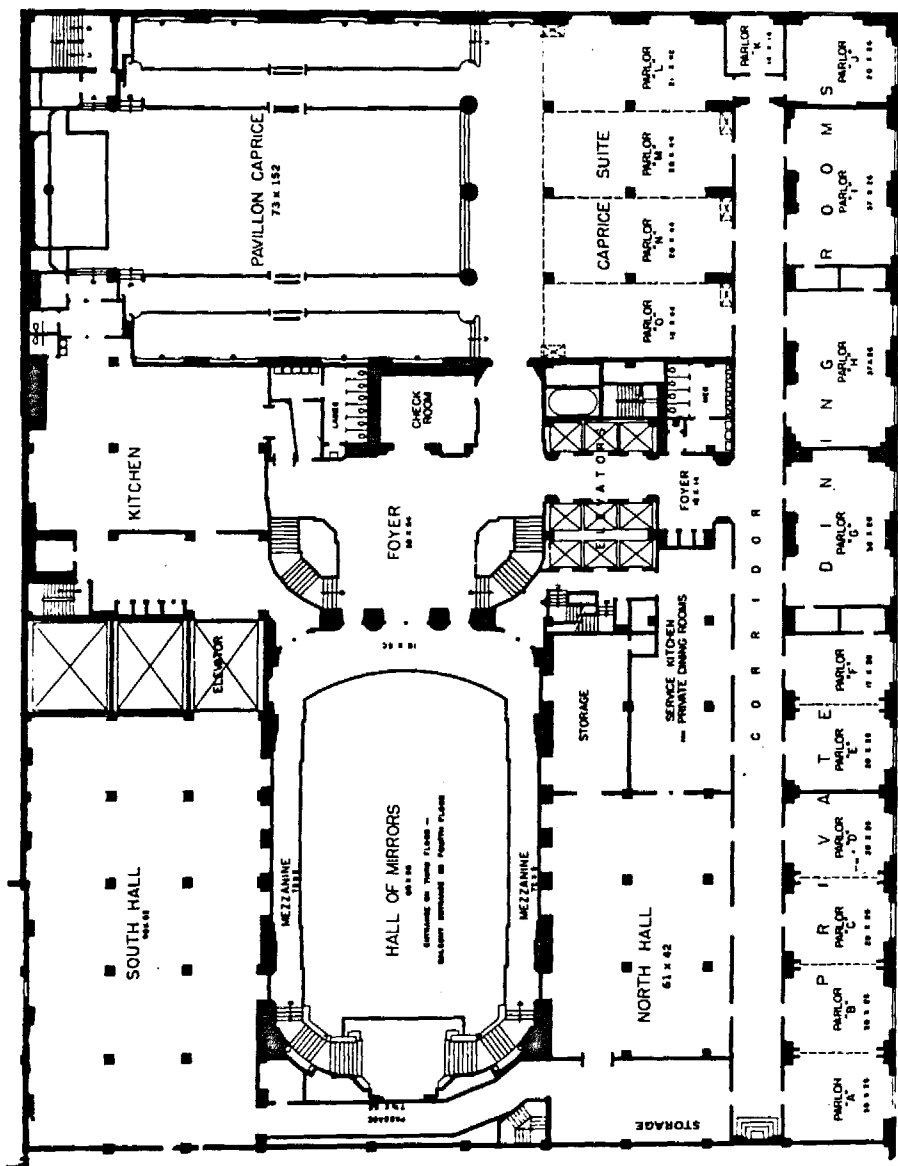
7. TRAINING SESSIONS - These sessions are devoted to topics of basic importance for conducting disciplined inquiry of particular types. They are to contain a thorough and sophisticated treatment of a research methodology, including training in the basic procedures to be used.

#### MECHANISM FOR 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. This "blind" evaluation of papers, panels, and symposia is an important feature in structuring the NARST Annual Meeting.



NETHERLAND HILTON HOTEL

FOURTH FLOOR PLAN

SOUTH HALL  
64 x 61

MEZZANINE  
31 x 51

HALL OF MIRRORS  
61 x 62  
SERVING ON THIRD FLOOR -  
ELEVATOR ENTRANCE ON FIFTH FLOOR

MEZZANINE  
31 x 51

NORTH HALL  
61 x 42

PAVILION CAPRICE  
73 x 152

KITCHEN

FOYER  
34 x 56

CHECK ROOM

ELEVATOR

STORAGE

SERVICE WITH  
PRIVATE DINING ROOMS

CORRIDOR

CAPRICE  
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NATIONAL ASSOCIATION FOR  
RESEARCH IN SCIENCE TEACHING

UNIVERSITY OF WASHINGTON  
COLLEGE OF EDUCATION  
SEATTLE, WASHINGTON 98195