

NARST NEWS

NATIONAL ASSOCIATION FOR RESEARCH IN SCIENCE TEACHING

Thaddeus W. Fowler, Editor, University of Cincinnati, OH

Vol. 32 (1)

March 1990

P R E S I D E N T

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Changes in Naturalistic and Experimental Research

Naturalistic research studies, utilizing ethnographic methods of data collection and triangulation-style approaches to data interpretation, are sending important and convincing messages to science educators about the potential effectiveness of strategies. Such messages have long been waiting because of past uninformed and unproductive attitudes concerning naturalistic research.

Modern-day Naturalists

Long past, for example, are the days when a few weak "scholars" drift toward naturalistic research with the goal of avoiding extensive literature reviews and understanding statistical concepts beyond the bare-bone course requirements of graduate programs. Instead, today's naturalistic researchers in science education must comprehend a wide range of descriptive and inferential parametric and non parametric statistics as well as difficult-to-implement approaches developed by ethnographers. In addition, these modern-day researchers must have as much concern about validity—yes, internal and external validity—as do experimentalists. Validity is still a central question in all scientific research. In contrast, a few too many naturalistic researchers of yesteryear pretended to perform "ethnographies" by throwing together a small hand full of poorly developed measures, assessing only qualitative variables, and reporting feeble and uninterpretable findings. Even worse, a small minority had the audacity to suggest that "the building of a (professional) consensus around empirical evidence" was not their concern. Such orientations in the seventies hurt this important naturalistic movement in science education.

How times have changed. Today's successful naturalistic researchers are concerned about critical issues of validity, about quantitative analyses such as factor

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Special Events at the 1990 NARST Meeting

SUNDAY, APRIL 8, 1990

2:00-5:00 P.M.

Training Session: *Interpretive Research in Science Education* presented by Kenneth Tobin and James Gallagher.

Training Session: *Use of the IBM PC for Data Analysis in Science Education Research* presented by Arthur White and Donna Berlin.

7:30-9:00 P.M.

General Session: *Documenting the National Reform Effort: NSTA's Scope and Sequence Project* presented by Iris R. Weiss.

9:30-11:00 P.M.

JRST-NARST Reception for New Members. All members invited!

MONDAY, APRIL 9, 1990

2:00-4:00 P.M.

General Session: *The Radical Constructivist Approach to Instruction* presented by Ernst von Glasersfeld.

4:14-5:45 P.M.

Talk with NARST President, William Holliday and JRST editors Ronald Good and Jim Wandersee.

7:30-10:00 P.M.

Networking Groups. A chance to continue the dialogue on research areas of individual interest.

TUESDAY, APRIL 10, 1990

12:00-2:00 P.M.

NARST Annual Awards Luncheon.

2:30-4:00 P.M.

Special Session: *Status of Science Education Research* presented by Raymond Hannapel of the National Science Foundation.

5:30-6:15 P.M.

Special session just for graduate students and new researchers: *Networking the Science Education Profession* presented by Frances Lawrenz and Ann Howe.

WEDNESDAY, APRIL 11, 1990

8:00-9:30 A.M.

Special Session: *Project 2061 Phase II: The Process of Developing Curriculum Prototypes* presented by Jo Ellen Roseman of AAAs.

(President)

analysis, about the related work of others, about the comprehensive interpretation of data, and about consensus building within the profession of science educators. This new breed of naturalistic researcher has provided experimentalists with the challenge of asking interesting questions based in new social-cognitive theories—theories partly modified by data produced by naturalistic research.

Naturalistic manuscripts and proposals investigating contextual questions are taken seriously by the editorial board of the *Journal of Research in Science Teaching* (JRST) and the NARST conference program committee. Better yet, many of these descriptive works, especially during the past decade, received high praise by JRST and NARST award committees—awards for improving science teaching through research.

Wanted: Additional Experiments

Researchers, naturalistic and non naturalistic, generally believe that one of the next steps in the process is for someone to formulate follow up questions of increased objectivity and added specificity². But, dyed in the wool researchers favoring naturalistic approaches logically are not the likely candidates to champion the experimental cause. Instead, others need to activate themselves and assess the relative effectiveness of promising strategies using the valuable contributions published by authors of naturalistic and other research. Meanwhile, naturalists will continue to add meaning to our conceptions about strategies by investigating contextual questions having a broad range of objectivity and specificity.

Naturalistic research, of course, never promised to provide information about the relative effectiveness of strategies in the first place. It, like all methodologies, has its limitations. So, perhaps it's time that researchers bent on doing experimental research consider verifying the effectiveness of promising strategies through experimentation.

Prawat³ in his excellent synthesis on promoting access to knowledge, strategies and dispositions describes some theoretically powerful strategies under current consideration in science, mathematics and reading education. A common strategy in these three areas is metacognition—a concept described and talked about to death but seldom evaluated, experimentally. Research people in mathematics and reading apparently are disturbed about the dearth of experimental work evaluating this and other concepts in their area. Perhaps, we should be too.

Experimentalists' Challenge

So, the experimentalists' challenge is here—moving from some of the old days of single-variable manipulation and assessment of trivial questions to the modern times of sophisticated experimentation. That means designing powerful yet realistic experiments like some of the 37 exemplary instructional studies applauded and criticized by Pressley⁴. These are not the "quick and dirty" designs so often published by *Reading*

Research Quarterly and JRST Journal in their earlier years. Instead, these designs use many of the process-performance measures developed by naturalistic and other researchers. Process measures include think-aloud protocols and a broad range of interview techniques, developed by ethnographers. Performance assessments include measures of achievement and motivation, delimited in realistic yet interesting contexts.

People who say, "Experimental designs are out of fashion or can not answer interesting questions in science education" are treading on thin scientific ice. Their argument is double talk because, on the one hand, experimental scientific research is the established mechanism of assessing functional relationships and is a necessary ingredient in theory development, but, on the other hand, some of the experiments of past years are incredibly uninteresting and unproductive.

In brief, it is about time that improved naturalistic research be a part of our research base. But, researchers favoring experimental investigation need to capitalize on the opportunities by asking questions mindful of classroom context, valid and realistic designs, and multivariate process and performance measures.

Postscript

In addition to increased experimentation, we need meta-analytic reviews of strategy experiments to help us theoretically understand experimental results. Such reviews combine modern meta-analytic techniques with the competent syntheses and analyses of the integrated review-style exemplified by Whitener⁵. Unlike the early eighties, well-refereed journals seldom accepted mechanical meta-analysis manuscripts void of an integrated review—as specified in the *APA Publication Manual*.

But, such meta analytic reviews as Whitener's are of little value if the experimental studies selected for analysis lack reasonable validity. So "pre-meta analytic" reviews like Pressley's⁴ evaluation of the internal and external validity of experimental studies perhaps are important links in the research process.

References

1. Krathwohl, D. R. (1985). *Social and behavioral science research* (p 1). San Francisco: Jossey-Bass.
2. Jacob, E. (1988). Clarifying qualitative research: A focus on traditions. *Educational Researcher*, 17 (1), 16–19, 22–24.
3. Prawat, R. S. (1989). Promoting access to knowledge, strategy, and disposition in students: A research synthesis. *Review of Educational Research*, 59, 1–42.
4. Pressley, M., Lysynchuk, L. M., D'Ailly, H., Smith, M., & Cake, C. (1989). A methodological analysis of experimental studies of comprehension strategy instruction. *Reading Research Quarterly*, 4, 458–470.
5. Whitener, W. M. (1989). A meta-analytic review of the effect on learning of the interaction between prior achievement and instructional support. *Review of Educational Research*, 59, 65–86.

From the Journal Editor

A special issue of *JRST* dealing with research on the theory and use of concept mapping in science education is being planned for late 1990. The issue's theme is PERSPECTIVES ON CONCEPT MAPPING. Joe Novak and Jim Wandersee have been asked to edit the issue. NARST members wishing to submit a paper for consideration should do so no later than June 1, 1990. Papers must be written to conform to *JRST* manuscript guidelines and should be submitted to the *JRST* editorial office at Louisiana State University.

Future special issues, edited by Associate Editors Rodger Bybee, Tony Lawson, Marcia Linn, and Jim Shymansky, will be announced in NARST News.

JRST Review Board members Mary Atwater, John Staver, and Larry Yore were confirmed by the NARST Board at the November Board meeting in Atlanta. Five additional NARST members have agreed to serve on the editorial Board: Kathleen Fisher (San Diego State University), Joel Mintzes (University of North Carolina at Wilmington), Mansoor Niaz (Universidad de Oriente, Venezuela), Peter Okebukola (Lagos State University, Nigeria), and Ed Pizzini (University of Iowa).

NARST members retiring from the Editorial Board include Barbara Strawitz (Louisiana State University) and Emmett Wright (Kansas State University). Both have provided excellent service to the *Journal* for four years.

A 1500-word description of the *JRST* editorial process is available from Editor Ron Good. The following sentence from that document is an example of an attempt to reduce the time required to complete the editorial process: "If a revised version of the article is not submitted within three months after the provisional acceptance letter was sent, the manuscript is treated as a new submission."

Comments and questions about the *JRST* can be directed to the Editor at our NARST meeting in Atlanta or at his LSU office.

Schedule for Association Business Meetings at NARST Conference

SUNDAY, APRIL 8, 1990

2:00-5:00 P.M.

Executive Board Meeting—Embassy Room. (Lunch will be served at 1:00 p.m.)

5:00-7:00 P.M.

JRST Editorial Advisory Board—Embassy Room. (A light meal will be served.)

MONDAY, APRIL 9, 1990

7:30-8:30 A.M.

Financial Advisory Committee—John Adams Room.

Publications Advisory Committee—George Washington Room.

Program Committee—Thomas Jefferson Room.

(Continental breakfast for all committees will be served beginning at 7:00 a.m.)

12:00-2:00 P.M.

Ad Hoc Committee Meetings during lunch: NARST Awards Committee, Distinguished Contributions Award Committee, and *JRST* Award Committee. Check with committee chairperson for specific meeting arrangements.

TUESDAY, APRIL 9, 1990

7:30-8:30 A.M.

Policy Advisory Committee—John Adams Room.

Research Committee—George Washington Room.

Elections Committee—Thomas Jefferson Room.

International Issues Committee—Milan Room.

(Continental breakfast for all committees will be served beginning at 7:00 a.m.)

6:00 P.M.

Executive Board Meeting and Dinner in the Embassy Room.

WEDNESDAY, APRIL 10, 1990

11:00 A.M.

NARST Business Meeting in Salon A & B.

NARST MONOGRAPHS AVAILABLE

A Theory of Instruction: Using the Learning Cycle to Teach Science Concepts and Thinking Skills, A. Lawson, M. Abraham, and J. Renner, \$6US

Learning Environment Research in Science Classrooms: Past Progress and Future Prospects, B. Fraser, \$6US

Send orders with check payable to NARST to Glenn C. Markle, NARST Executive Secretary, College of Education, University of Cincinnati, Cincinnati, OH 45221-0002

NARST Monographs Order Form

Please send me the following:

____ copy(ies) of *A Theory of Instruction* at a cost of \$6US each

____ copy(ies) of *Learning Environment Research in Science Classrooms* at a cost of \$6US each

Name: _____

Address: _____

ZIP _____

NARST Membership Application/Information

I am interested in becoming a member of the National Association for Research in Science Teaching.

Please send me information about the Association and a membership application form.

Please enroll me as a member of NARST for the 1990 calendar year.

If enrolling as a member, please check the appropriate category and enclose a check to NARST payable in U.S. funds.

Regular membership @ \$54.00 per year.

Student membership @ \$30.00 per year.

I attest that _____
is eligible for student membership in the National Association for Research in Science Teaching.

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country

Please send membership application/information requests to Dr. Glenn Markle, Executive Secretary, NARST, University of Cincinnati, Cincinnati, OH 45221-0002.

EARLY REGISTRATION

The NARST Registration Desk will be open
from 1-4:30 p.m. Sunday, April 8.

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