A six-year program providing training for ten individuals in science education and seven in mathematics education research is described. Lists of program objectives, requirements and course work for the program, and faculty members involved are included along with information on selection of trainees, enrollment by year, resulting dissertation titles, and present location of graduates. (DT)
Milton O. Pella, Director
School of Education
University of Wisconsin
Madison, Wisconsin 53706

Science and Mathematics Education Research Training Program

September 1972

Sponsor - U. S. Department of Health, Education and Welfare
Office of Education
The six year program provided training for 10 individuals in science education and 7 in mathematics education research. The trainees came from the United States and all had a 2.75 or better GPA and had earned a M.S. degree prior to admission.

Program

Each mathematics education candidate, prior to completion of the program, completed course work in mathematics equivalent to that required for the M.S. in mathematics.

Each science education candidate, prior to the completion of the program, completed a minimum of one year of course work in biology, chemistry, physics, and earth science, the equivalent in course work of the M.S. in one of the disciplines, and a minimum of one year of calculus.

Course work supplementing the science and mathematics courses related to research training included statistical analysis, research design, curriculum development; philosophy of education, science education and/or mathematics education, computers and psychology of learning.

Each candidate planned an individual research project following his participation in a research practicum. The course work of the trainees included academic offerings of many departments in the University and the individual research involved the following University of Wisconsin centers and laboratories; 1. Center for Research Design, 2. Scientific Literary Research Center, 3. Survey Research Center, 4. Mass Communication Research Center, 5. University Computing Center, and 6. Educational Research and Development Center as well as the State Department of Public Instruction and many local school systems and universities in the U.S.A.
FINAL REPORT

Project No. 6-2681

Grant Numbers:
OEG 3-6-062681-1534
1-7-062681-3599
0-8-062681-3673(010)
0-9-062681-4255(010)
0-703536(520)
0-71-3544

Science and Mathematics Education

Research Training Program 1966-1972

Milton O. Pella, Director
School of Education, University of Wisconsin
Madison, Wisconsin

September 1972

The Research Training Program herein reported was carried on pursuant to a grant from the Office of Education, U.S. Department of Health, Education, and Welfare
The Science and Mathematics Research Training Program was conducted at this University for a period of six years. During this time each trainee enrolled who completed the program, earned the Ph.D. degree, and subsequently was employed in a college or university where he has been able to conduct himself commensurate with his training.

The trainee program consisted of four parts: a. academic preparation in science or mathematics; b. academic preparation in science or mathematics education to include statistics, research design, curriculum development, philosophy, and psychology; c. working 8-10 hours per week on research under an experienced researcher for at least one year; and d. completing one research project on a topic of his selection. Each of the trainees devoted more than 600 hours to research during the term of the program.

Throughout the period of training each trainee had available to him, on this campus, the services of the a. Center for Research Design, b. Scientific Literacy Research Center, c. Survey Research Laboratory, d. Mass Communication Research Center, e. University Computing Center, and f. Education Research and Development Center, as well as the counsel of scholars from all academic departments.

The trainees were selected from the U.S.A. on the basis of merit. Each year announcements were sent to leading institutions in the U.S. inviting applicants to apply to the program.
A. Program Objectives

1. General Objectives
   To prepare capable students as research specialists in Science Education and Mathematics Education.

2. Specific Objectives
   a. To develop academic competence in Science and Mathematics.
   b. To develop competence in the design and conduct of several varieties of research: clinical, experimental, survey, etc.
   c. To provide experience in research areas in the schools.
   d. To stimulate interest in educational research.
   e. To develop a reasonable philosophic background for the researcher (Ph.D Degree).

B. Program

1. Each Mathematics Education trainee, prior to completing the program, completed course work in mathematics equal to that required for the M.S. in mathematics.

2. Each Science Education trainee, prior to completing the program, completed one year of course work in biology, chemistry, earth science, and physics, course work equal to that required for the M.S. in one of the disciplines, and a minimum of one year of calculus.

3. The trainees developed competence in research as a result of: year 1 - successfully completing courses devoted to research design, devoting 6-8 hours per week to a research project working as a member of a research team or under an experienced researcher,
and years 2 and 3 - devoting 8-10 hours per week to a research project of his own. Each trainee devoted more than 600 hours to research during the program and completed at least one piece of independent research.

4. The trainees in science and mathematics education met as separate groups for a minimum of one two hour seminar per week to discuss the research needs and problems of science and mathematics education respectively.

5. Professional Education course requirements.

- Statistical Method Applied to Education 3 cr. (A)
- Intermediate Statistics 3 cr. (A)
- Multivariate Analysis 3 cr. (B)
- Statistical Analysis and Research Design 3 cr. (B)
- Computers 2-3 cr. (A)
- Foundations of Educational Measurement 3 cr. (B)
- Curriculum Construction 3 cr. (A)
- Philosophy of Education 3 cr. (B)

[(A) - all students completed]
[(B) - depends upon interests of student]

Science Education

- Advanced Problems in Science Education 3 cr. (X)
- Science in the Elementary School 3 cr. (X)
- Seminar in Science Education 2 cr. (X)

[(X) - Science Education Students]

Mathematics in the Secondary School 3 cr. (Y)
Mathematics in the Elementary School 3 cr. (Y)
Seminar in Mathematics Education 2 cr. (Y)
[(Y) - Mathematics Education Students]

Faculty

Dr. Jack A. Reed - Science Education. Ph.D. - University of Illinois - 1966.

Experience - Eastern Illinois University, 60-63; University of Illinois, 64-65; Southeast Missouri State College, 65-67; Northern Nigeria Teacher Education Project, 67-69.


Assignment - Assistant Professor, Department of Curriculum and Instruction


Experience - Ohio State University, 67-69


Assignment - Assistant Professor, Wisconsin R & D Center and Department of Curriculum and Instruction.

Dr. Thomas Romberg - Ph.D. Stanford University, 1967.

Experience - SMSG Writing Team 1964.

Assignment - Associate Director, Wisconsin R & D Center, Associate Professor, Wisconsin R & D Center and Department of Curriculum and Instruction.


Dr. Henry Van Engen - Mathematics Education

Assignment - Emeritus Professor, Department of Mathematics and Curriculum and Instruction.

Dr. Milton O. Pella - Science Education

Assignment - Professor, Department of Curriculum and Instruction and Wisconsin R & D Center. Director of U.S.O.E. Research Training Program.
C. Trainees

1. Selection

Applicants were solicited through the wide distribution of a duplicated publication that included a description of the program and the method and deadline of application. All applications were received on a standard form. Those applications received by April 1 were summarized as to: 1. GPA, 2. Age, 3. Statement of purpose, 4. Depth and breadth of academic preparation, 5. Nature of experience, and 6. Judged potential.

The most promising candidates were selected by a committee of professors of science and mathematics education. There were generally five trainees each in science and mathematics education in residence per year.

2. Enrollment by year

1966-67

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</table>
1967-68 Program Year

1. None

2. Benzinger, Thomas L. (withdrew at end of year)
   Boles, Donald (completed)
   Janke, Delmar L.
   King, Irvin L.
   Niedfeldt, Gerald W. (withdrew at end of year)
   Shepler, Jack L.
   Sherman, Jack (completed)
   Swartney, Joyce (completed)
   Thompson, Walter (withdrew at end of year)
   Weinbrenner, Leroy B.

3. None

1968-69 Program Year

1. Agin, Mike L.
   Carpenter, Thomas P.
   Grouws, Douglas A.
   Huffman, Gary E. (withdrew during first semester)
   Swan, Jack A.
   Thompson, Benjamin E.

2. None

3. Janke, Delmar L. (completed)
   King, Irvin L. (completed)
   Shepler, Jack L. (completed)
   Weinbrenner, Leroy B. (completed)
1969-70

Program Year

1. Foster, Thomas E.
   Hartman, Dean D.
   Hunsaker, David D. (withdrew)
   Montague, Margariete A.
   Reed, Ralph K. (withdrew)

2. Agin, Michael L. (completed)
   Carpenter, Thomas P.
   Grouts, Douglas A.
   Swan, Jack A. (completed)
   Thompson, Benjamin E. (completed)

3. None

1970-71

Program Year

1. Palmer, Glenn
   Wall, Charles (withdrew)
   Wiles, Clyde

2. Foster, Thomas (completed)
   Hartman, Dean (completed)
   Montague, Margariete A. (completed)
   Ogden, William
   Reed, Ralph (withdrew)

3. Carpenter, Thomas (completed)
   Grouts, Douglas (completed)
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<td>3. Ogden, William (completed)</td>
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### 3. Period of Support for Trainees in Years

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<td>Ogden (3)</td>
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4. Geographic Origins of Trainees

- Arizona (1)
- California (3)
- Colorado (1)
- Florida (1)
- Idaho (1)
- Illinois (2)
- Indiana (1)
- Michigan (2)
- Montana (1)
- New York (2)
- North Dakota (1)
- Oklahoma (1)
- Pennsylvania (1)
- South Dakota (2)
- Texas (2)
- Wisconsin (6)
5. Titles of Dissertations


Sherman - "The Relative Effectiveness of Two Methods of Utilizing Laboratory-Type Activities in Teaching Introductory Physical Science." 1968.

Swartney - "Learning Difficulties Encountered by Students Studying the CHEM Study Program." 1968.


Foster - "Computer Programmed Individualized Instruction in Mathematics."


Carpenter - "An Investigation of Several Factors Underlying Conservation of Quantity and Numerousness."


Continuing Students

Hobbs - "An Indepth Analysis of Errors in the Use of the Distributive Property."

Rowe - "Teaching Objectives for Science in the Middle Schools."

Wiles - "Teaching the Algorithms of Addition and Subtraction involving Two Digit Whole Numbers."

6. Locations of Graduates

Boles, Ronald Central Washington State University Ellensburg, Washington 98926

Associate Professor of Biology Education
<table>
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<td>Janke, Delmar</td>
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<td>Honolulu, Hawaii 96822</td>
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<td></td>
<td>Chairman - Laboratory School</td>
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<td>Indiana, Pennsylvania</td>
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<td>Swartney, Joyce</td>
<td>State University College</td>
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<td>Sherman, Jack</td>
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<td>University of Missouri</td>
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<td>Columbia, Missouri</td>
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</table>
Carpenter, Thomas P. Boston University
Boston, Massachusetts

Foster, Thomas Sam Houston College
Texas

Agin, Michael L. Michigan Technological University
Houghton, Michigan
Assistant Professor of Science Education

Thompson, Benjamin E. Wisconsin State University
Eau Claire, Wisconsin
Assistant Professor of Science Education

Swan, Jack A. Eastern Washington University
Cheney, Washington
Department of Mathematics

Hartman, Dean State Department of Education, Iowa
Cedar Falls, Iowa

Palmer, Glenn Rider College
New Jersey

Ogden, William East Texas State University
Commerce, Texas

Hobbs, C. E. University of Wisconsin - Assistant

Rowe, Ronald University of Wisconsin - Assistant

Wiles, Clyde University of Wisconsin - R & D Center