



Dr. Lawrence Lowery

Dr. Lowery is a professor emeritus at the University of California at Berkeley. He remains active as the Principle Investigator for the Full Option Science System[®] (FOSS[®]). Dr. Lowery is the author of more than 50 articles and 31 books. His works include books published by the National Science Teachers Association (NSTA), the Association for Supervision and Curriculum Development (ASCD), and a supplement to the National Science Education Standards, published by the National Research Council.

He continues to publish and edit articles and books, the most recent being *The Kingfisher Science Encyclopaedia* (New York and London, 1993), *Pathways-Guidelines to Implementing the Science Standards* (NSTA publication, 1997), *The Biological Basis for Thinking and Learning* (Lawrence Hall of Science Monograph, 1998), *How Science Curriculums Reflect Brain Research* (Phi Delta Kappan article, November 1998), one of several authors of *Teaching for Inquiry* (National Science Education Standards Addendum, 2000) and *Developing Minds* (Association for Supervision and Curriculum Development, 2001).

His many accolades include the President's Quality Gold Award from Sandia Laboratories for the Distinguished Program in Science Education (LASER), the Distinguished Career in Science Award from the NSTA, the Outstanding Science Educator Award from the Association for the Education of Teachers of Science, and the Outstanding Teacher Education Program for Elementary Science award from the California State Department of Education. Dr. Lowery was inducted into the Texas Science Hall of Fame and named the 2002 Champion for Science.

DR. LAWRENCE F. LOWERY

Graduate School of Education/Lawrence Hall of Science

University of California

Berkeley, California 94720

(510) 642-4206 (Graduate School of Ed)

(510) 642-8941 (LHS)

SUMMARY STATEMENT

Lawrence Lowery is a professor emeritus at the University of California at Berkeley. He remains active as the Principle Investigator for the Full Option Science System (FOSS), a science curriculum for grades K-8 developed at the Lawrence Hall of Science. He continues to publish and edit articles and books, the most recent being *The Kingfisher Science Encyclopaedia* (New York and London, 1993), *Pathways-Guidelines to Implementing the Science Standards* (NSTA publication, 1997), *The Biological Basis for Thinking and Learning* (Lawrence Hall of Science Monograph, 1998), *How Science Curriculums Reflect Brain Research* (Phi Delta Kappan article, November 1998), one of several authors of *Teaching for Inquiry* (National Science Education Standards Addendum, 2000) and *Developing Minds* (Association for Supervision and Curriculum Development, 2001).

EXPERIENCE

Professor, 1978-present

Assistant Dean, 1978-1983

Associate Professor, 1971-1978

Assistant Professor, 1965-1971

University of California, Berkeley

Public School Principal, 1963-65

Oakland Unified School District

Oakland, California

Vice Principal, Summer Demonstration School, 1964, 1965

UC Berkeley/Berkeley Unified School District

Berkeley, California

Demonstration Teacher, Summer School, 1960-1964

UC Berkeley/Berkeley Unified School District

Berkeley, California

Teacher, 1957-1963

Oakland Unified School District (elementary and secondary science)

Oakland, California

Visiting Professor

University of Hawaii, 1991

Melbourne University, Australia, 1988

Western State College, 1979

Long Island University, 1979

Lesley College, 1979

Baldwin-Wallace College, 1979

National College of Education, 1979

Rutgers University, 1969

University of Hawaii, 1967

PUBLICATIONS

Articles

- Lowery, L. (1964). Process patterns and structural themes in science. *The Science Teacher*, 9, 16-19.
- Lowery, L. (1964). It's math, but is it new? *California Teachers Association Journal*, 60, 29-43.
- Lowery, L. (1965). Transition in math and science. *California Teachers Association Journal*, 61, 7-11.
- Lowery, L. (1966). Leaf study - a process approach. *Science and Children*, 9, 18-20.
- Lowery, L. (1966). Development of an attitude measuring instrument for science education. *School Science and Mathematics*, 66, 494-502.
- Lowery, L. (1967). An experimental investigation into the attitudes of fifth grade students toward science. *School Science and Mathematics*, 67, 569-579.
- Lowery, L. (1967) Graphic presentation of plant growth. *Science and Children*, 4, 15-17.
- Lowery, L. and Grafft, W. (1968). Paperback books and reading attitudes. *The Reading Teacher*, 21, 618-623.
- Lowery, L. (1968). Research and development of science programs: Dimensions for consideration. *School Science and Mathematics*, 66, 554-559.
- Peterson, R. and Lowery, L. (1968). A study of curiosity factors in first grade pupils. *Science Education*, 52, 347-352.
- Lowery, L. (1968). Soil gardening. *Science and Children*, 5, 7-10.
- Lowery, L. (1968). Soilless gardening. *Science and Children*, 9, 18-19.
- Lowery, L. (1969). The vivarium. *Science and Children*, 7, 22-25.
- Lowery, L. (1969). A study of the attitudes of parents toward teachers. *Journal of Educational Research*, 62, 227-230.
- Lowery, L. and Allen, L. (1969). Visual resemblance and sorting ability among first grade pupils. *Journal of Research in Science Teaching*, 6, 248-256.
- Lowery, L. and Carus, F. (1970). The usefulness of closed circuit television and psychogalvanic response in the training of teachers. *Journal of Research in Science Teaching*, 7, 353-361.
- Lowery, L. and Allen, L. (1970). Socio-economic status and sex differences in visual resemblance sorting tasks at the first grade level. *Journal of Research in Science Teaching*, 7, 57-65.
- Peterson, R. and Lowery, L. (1972). The use of motor activity as an index of curiosity in children. *Journal of Research in Science Teaching*, 9, 193-200.
- Lowery, L. and Allen, L. (1973). Smallest space analysis of visual resemblance sorting behaviors. *School Science and Mathematics*, 73, 229-236.
- Lowery, L. (1975). A framework for interpretation. In *Touch, Interpreters Information Exchange*, U.S. Parks Department, 5, 5-7.
- Lowery, L. and Leonard, W. (1976). Questioning style: A criterion for biology textbook selection. *The American Biology Teacher*, 35, 477-479.
- Lowery, L. and Leonard, W. (1978). A comparison of questioning styles among four widely used high school biology textbooks. *Journal of Research in Science Teaching*, 15, 1-10.
- Lowery, L. and Allen, L. (1978). Visual resemblance sorting abilities of U.S. and Malaysian first-grade children. *Journal of Research in Science Teaching*, 15, 287-292.
- Leonard, W. and Lowery, L. (1979). A quantitative procedure for verifying treatments in educational research. *Educational Researcher*, 8, 4-7.
- Lowery, L. (1979). Life before birth. *Learning*, 7, 45-58 (AWARD Winning Article).
- Lowery, L. (1979). Piagetian theory applied to teacher education and curriculum research. *Proceedings: UAP-USC Eight Annual International Interdisciplinary Conference on Piagetian Theory and the Helping Professions*, University of Southern California.
- Lowery, L., Bowyer, J., and Padilla, M. (1980). The Science Curriculum Improvement Study and Student Attitudes. *Journal of Research in Science Teaching*, 17, 327-355.
- Lowery, L. (1980). Toward improving the science education research enterprise. *Journal*

of Research in Science Teaching, 17, 275-281.

Leonard, W., Cavana, G, and Lowery, L. (1981). An experimental test of an extended discretion approach for high school biology laboratory investigations. Journal of Research in Science Teaching, 18, 479-504.

Leonard, W. and Lowery, L. (1984). The effects of question types in textual reading upon retention of biology concepts. Journal of Research in Science Teaching, 4, 377-384.

Flanders, N., Lowery, L., et.al. (1987). Support systems for teachers who form partnerships to help each other improve teaching. Teacher Education Quarterly, 14, 5-24.

Lowery, L. (1991). The growing classroom. Garden-based science. Book review. Cooperative Learning, 3, 40.

Lowery, L. (1991). Preparing future teachers to teach science and mathematics. The Educator, 5, 14-15.

Lowery, L. (1991). A new curriculum design for elementary school science. The Educator, 5, 16-19.

Lowery, L. (1991). The biological basis for thinking. Chapter 21 in Developing Minds, Volume 1 (ed. Costa, A.), Association for Supervision and Curriculum Development, Alexandria, VA, 108-117.

Lowery, L. (1993, reprinted 1994). The importance of understanding child development in curriculum development. FOSS Newsletter, 1, 4-5.

Lowery, L. (1993). Changing the metaphor. FOSS Newsletter, 2, 8-10.

Lowery, L. (1994). Inquiry: The emphasis of a bold, new science curriculum. Technological Horizons in Education Journal, 21, 50-52.

Lowery, L. (1994). Communities of practice. FOSS Newsletter, 4, 8-10.

Lowery, L. (1995). Partners with researchers. FOSS Newsletter, 5, 8-11.

Lowery, L. (1996). Benchmarks and standards: an historical perspective. FOSS Newsletter, 6, 8-11.

Lowery, L. (1997). The Nature of Learning. FOSS Newsletter, 10, 11-12.

Lowery, L. (1998). Strategies for instruction: Classroom arrangements and teaching. FOSS Newsletter, 11, 6-9.

Lowery, L. (1998). The biological basis for thinking and learning. Monograph. Lawrence Hall of Science, University of California, Berkeley.

Lowery, L. (1998). History of Science Standards. San Antonio USI Newsletter, 1, 2-3.

Lowery, L. (1998) How Science Curriculums Reflect Brain Research. Educational Leadership, 56, 3, 26-30.

Lowery, L. (1999). If It Ain't Broke. . .the Why Behind the FOSS Revisions. FOSS Newsletter, 13, 8-10.

Lowery, L. (2000). The scientific thinking processes. Monograph. Lawrence Hall of Science, University of California, Berkeley.

Lowery, L. (2000), Questioning and Responding Strategies. Monograph. Lawrence Hall of Science. (2001).

BOOKS

Lowery, L. et al. (1966). Science, A Modern Approach. Holt, Rinehart and Winston, Inc. Textbook series in science for Grades 1-9.

Lowery, L. (1967). Beginning Science. Holt, Rinehart and Winston, Inc. Preschool/ kindergarten program in science.

Lowery, L. (1969). I Wonder Why Readers. Holt, Rinehart and Winston, Inc. Books on science topics for Grades 1-3: 24 titles plus a teacher's manual.

Lowery, L. et al. (1971). Modern Elementary Science. Holt, Rinehart and Winston, Inc. Textbook, materials, and evaluation program in science for Grades 1-9. Includes films, kits of materials, transparencies, evaluation component.

Lowery, L. and Costa, A. (1971). Strategies for Science Instruction. JS2, Inc., Hayward, CA. College textbook for pre/in-service teachers.

Lowery, L. and Costa, A. (1976). A Personal Training Program for Park Interpreters. National Park Service, Division of Interpretation, Washington D.C. Training program for all park interpreters. Includes video tapes.

Lowery, L. (1976). A Personal Training Program for Museum Docents. Oakland Museum Association, Oakland, CA. Training program for all museum docents.

Lowery, L. (1978). California Science Framework. (Consultant/Writer for statewide committee). California State Department of Education.

Friedman, A., Lowery, L., Pulos, S., Schatz, D., and Sneider, C. (1980). Planetarium Educator's Workshop Guide. International Planetarium Society, Alexandria, VA. Training program for planetarium personnel (An AWARD winning book).

Lowery, L. and Marshall, H. (1980). Learning About Instruction: Teacher-Initiated Verbal Directions and Eliciting Questions. Educational Research and Applications Program, University of California, Berkeley. Pre-service and in-service K-12 teacher training program.

Lowery, L. (1981). Learning About Learning: Conservation Abilities. Educational Research and Applications Program, University of California, Berkeley, CA. Pre-service and in-service K-12 teacher training program.

Lowery, L. (1981). Learning About Learning: Classification Abilities. Educational Research and Applications Program, University of California, Berkeley, CA. Pre-service and in-service K-12 teacher training program.

Lowery, L. (1981). Learning About Learning: Propositional Abilities. Educational Research and Applications Program, University of California, Berkeley, CA. Pre-service and in-service K-12 teacher training program.

Lowery, L. (1984). California Science Framework Addendum. (Consultant/Writer for statewide committee) California State Department of Education.

Lowery, L. (1985). The Everyday Science Sourcebook: Ideas for Teaching in the Elementary and Middle Grades. Dale Seymour Publications, Menlo Park, CA. Teacher training and activity sourcebook.

Bowyer, J. and Lowery, L. (1985). Industry Initiative for Science and Math Education: The Bay Area Pilot Program. Lawrence Hall of Science, Lockheed, Hewlett-Packard, AT&T, IBM, Raytheon, and Pacific Bell Publication.

Lowery, L. (1986). Evaluation Guide to Educational Computer Software. SoftKat, Inc., Van Nuys, CA.

Lowery, L. (et al.). (1986). Developmental Mathematics: It's the Thought That Counts. Dale Seymour Publications, Menlo Park, CA. Teacher training and activity sourcebook.

Lowery, L. (et al.). (1986). Technology in the Curriculum: Science. California State Department of Education.

Lowery, L. and Verbeeck, C. (1987). Explorations in Earth Science. David S. Lake Publishers, Belmont, CA.

Lowery, L. and Verbeeck, C. (1987). Explorations in Life Science. David S. Lake Publishers, Belmont, CA.

Lowery, L. and Verbeeck, C. (1987). Explorations in Physical Science. David S. Lake Publishers, Belmont, CA.

Lowery, L. and Dyer, P. (1987). Thinking About Science, Levels B, C, D, E, F. Modern Curriculum Press. Workbook series for Grades 2-6. Cleveland, OH.

Lowery, L., Armstrong, S. and Hogan, B. (1989). The Educational Software Review Guide. SoftKat, Inc., Van Nuys, CA.

Costa, A. and Lowery, L. (1989). Techniques for Teaching Thinking. Critical Thinking Press, Pacific Grove, CA.

Lowery, L. Thinking and Learning. (1989). Books for Educators, Kent, WA.

Lowery, L. California Science Framework. (1990). (Consultant/Writer for statewide committee) California State Department of Education.

Lowery, L. (Ed.) (1993-4). Science Encyclopaedia. Two editions: Single volume and ten Volumes. Encyclopaedia Britannica/Kingfisher Publishers, Chicago/London.

Lowery, L. (Ed.) (1997). Pathways. Guidelines for implementing the National Science Standards. National Science Teacher's Association, Arlington, VA.

Lowery, L. (one of several authors) (2000). Teaching for Inquiry. Supplement book to the National Science Education Standards. National Research Council, Arlington, VA.

Lowery, L. (one of several authors) (2001). Developing Minds. Association for

Supervision and Curriculum Development. Alexandria, VA.

VIDEO/FILMS/MATERIALS

Learning Biology. Four filmstrips on biology. Topics include: Photosynthesis, Tropisms. Bailey Film Associates, Los Angeles, CA, 1970.

Plant Germination. Film loop - time-lapse photography of seed germination. Bailey Film Associates, Los Angeles, CA, 1971.

Animals of Africa. 16 mm film. Coronet, New York, NY, 1979.

Growing, Growing. 16 mm film on school gardens. Standard Oil, Richmond, CA, 1980.

Discovery Kits. Twelve kits of science materials complete with teacher's manual and student workbooks. Topics include: Balance, Simple Machines, Friction, Electric Circuits, Magnetism, Sound, Light, and so on. Science Kit and Boreal Laboratories, Tonawanda, NY, 1984.

Science Essentials. 57 interactive videotapes or 13 laser discs for grades 3-6. Topics include: Magnetism, Electricity, Plants, Animals. Laser disc version has two variations - a bar coding feature or a computer controlled system. Encyclopaedia Britannica Educational Corporation, Chicago, 1992.

Science Essentials. 22 interactive videotapes for grades K-2. Encyclopaedia Britannica Educational Corporation, Chicago, 1993.

Full Option Science System-Elementary. 27 instructional modules arranged in a developmental sequence to provide a complete science curriculum for pre-school through grade 6. Modules utilize kits of specially designed materials rather than texts. System includes sets of authentic assessment devices of three types (hands-on, pictorial, and narrative). System is supplemented by 18 videotapes designed to familiarize teachers with FOSS. The set includes an overview videotape, a videotape on The Biological Basis for Thinking and Learning, and 16 training tapes. Lawrence Hall of Science/Delta Education, 1989-present.

Peter Rabbit's Math Garden. Award winning CDROM program (Newsweek)-pre-school mathematics. Mindscape, 1996.

Full Option Science System-Middle Grades. 9 instructional modules for grades 6-8. In development, National Science Foundation Grant, 1997-2002.

AWARDS

Distinguished Teaching Award, 1975-76

University of California, Berkeley

Outstanding Professional Article in Science, 1981

"Before Birth," Learning Magazine

Award given by the National Press Association.

Outstanding Publication, 1981

"Planetarium Educator's Workshop Guide"

Award given by the International Planetarium Society.

Outstanding Teacher Education Program 1983

Educational Research and Applications Pre-service and In-service Program California Council for the Education of Teachers.

Outstanding Teacher Education Program for Elementary Science 1985

California State Department of Education; National Science Teachers Association

Outstanding Science Project (SIRC) 1987

California State Department of Education; U.S. Department of Education.

Outstanding Science Educator 1989

Association for the Education of Teachers of Science (AETS).

Distinguished Career in Science Award 1993

National Science Teachers Association (NSTA)

Best Software Program in Mathematics (1996)

Peter Rabbit's Math Garden, CD ROM (Mindscape); Newsweek Editor's Choice

President's Quality Gold Award (1998)

Sandia Laboratories for Distinguished Program (LASER) in Science Education

GRANTS

- "Identification and Analysis of Some Aspects of Exploratory Behavior (Curiosity) in Elementary School Children," U.S. Office of Education, 1969-70 (with R. Peterson)
- "Assessment of Student Response to a Baccalaureate Degree Nursing Curriculum," Public Health Service Grant, 1971 (with J. Urrea)
- "Curiosity, Persistence, and Problem-Solving Behaviors Among Elementary School Children," U.S. Office of Education, 1972 (with R. Peterson)
- "Science and Mathematics Instruction for Secondary School Teachers," National Science Foundation, 1973
- "Elementary School Science Curriculum and Supervision," National Science Foundation, 1973
- "Establishment of a Teacher Center at the Lawrence Hall of Science," National Science Foundation 1974-75
- "A Center for Research in Science Education at the Lawrence Hall of Science," National Science Foundation, 1974-75 (with four other professors)
- "Advancement of Education in Science-Oriented Programs (AESOP)," National Science Foundation, 1976 (with four other professors)
- "Equals - Sex-fair Instruction and Counseling in Mathematics," U.S. Office of Education, 1977-present (with N. Kreinberg)
- "Physically Disabled Scientists Project," National Science Foundation, 1978-79
- "Hand-Held Calculator Project," National Science Foundation and Texas Instruments, 1980-83
- "Family Math," U.S. Office of Education, 1983-1985
- "Bay Area Mathematics Project," California State Department of Education, 1983-present (with L. Henkin).
- "American Mathematics Project," Ford Foundation, 1984-85 (with L. Henkin and E. Stage).
- "Science and Technology Project," California State Department of Education, 1985.
- "Industrial Initiatives in Science and Math Education," Hewlett-Packard, Raytheon, Pacific Bell, Lockheed, IBM, and 8 other industries, 1985-86 (with M. Gardner, R. Rice, and J. Bowyer).
- "Equals in Computer Technology," National Science Foundation, 1985-88.
- "Technology in Curriculum Projects 'Science and Technology,'" State Department of Education, 1986-87. Establishment of tech centers and the annual review of science software for California.
- "Science Inservice for Rural California," California Postsecondary Education Commission, Title II, Federal Public Law 98-377, 1986-88. Establishment of a program in science, specially designed for the rural areas of Northern California.
- "Consortium for Excellence in Mathematics Education," (with A. Schoenfeld) California State Department of Education, 1986-88. An experimental program for establishing Mathematics Specialist credentials.
- "Full Option Science System, Grades 3-6" National Science Foundation, 1988-91. A complete hands-on/minds-on program in science.
- "Science Update: National Inservice Training Program," National Science Foundation, 1989-92. Development of a model for improving science instruction.
- "Full Option Science System, Grades K-2," National Science Foundation, 1991-95. An extension of the earlier 3-6 program.
- "A Model Program for the Preparation of Mathematics and Science Teachers at the Secondary School Level," (with A. Schoenfeld and B. White) National Science Foundation, 1991-96. A new high school science credential program for U.C. Berkeley.
- "Galaxy Classroom," (with Norm Avrech) Hughes Aircraft and the National Science Foundation, 1991-96. An interactive satellite project for teaching science.
- "Mathematics Middle School Demonstration Project," California State Department of Education, 1992-95.
- "California Mathematics Coordination Project," California State Department of Education, 1993-96.

"Full Option Science System, Grades 6-9," National Science Foundation, 1996-2000. An extension of the earlier K-6 program.

PROFESSIONAL AFFILIATIONS

American Association for the Advancement of Science (AAAS)
American Educational Research Association (AERA)
Association for Supervision and Curriculum Development (ASCD)
Association for the Education of Teachers of Science (AETS)
President 1970-71
California Council for the Education of Teachers (CCET)
California Science Teachers Association (CSTA)
California Teachers Association (CTA)
Elementary School Science Association (ESSA)
President 1972-73
National Association of Biology Teachers (NABT)
National Association for Research in Science Teaching (NARST)
National Science Teachers Association (NSTA)
Phi Delta Kappa

EDITORIAL/ADVISORY BOARDS

Allyn and Bacon, Inc., 1974-1978
Bailey Film Associates, 1970-78
Behring Museum
Member of Advisory Board, 1986-89
California Assessment Program (CAP), 1984-present
California State Department of Education Science Framework Committee, 1976-90
Compton's Encyclopaedia
Member of Board of Directors, 1991-present
Encyclopaedia Britannica Educational Corporation, 1987-1996
Holt, Rinehart and Winston, Inc., 1965-75
Hughes Aircraft - Galaxy Classroom Program
Co-director, 1990-present
Journal of Research in Science Teaching
Member of Review Board, 1980-1985
Individual Software
Member of Board of Directors, 1984-present
Intelligy Corporation
Member of Host Board, Member of Strategic Board, 1989-present
Lawrence Hall of Science
Member of the Advisory Board, 1968-present
Learning Magazine
Member of Review Board, 1974-1982
Mindscape
Member of the Advisory Board, 1994-present
School Science and Mathematics Journal
Member of Review Board, 1978-82
Science Education
Member of Review Board, 1970-74
SoftKat, Inc.
Director of Review Board, 1983-90
University of California Science Museum, Blackhawk
Member of Advisory Board, 1987-1990.